Active Paper Market for 1924

THE various declines that have occurred in paper during the month of November, all contributed toward further deadness in the paper market. At the present writing, it is the evident intention of every jobber and consumer in the United States to withhold all purchases, except those absolutely needed between now and Christmas time, until after the first of the year.

On January first the jobbers of the United States, with very few exceptions, will probably find themselves in this condition: their stock will have been converted into money; their bank loans liquidated, and there will be a comfortable balance to their credit in the banks, but no stock in their warehouses. Not much money can be made on interest allowed on bank balances, and with the advent of January 1st, there will without doubt be a large movement of buyers toward the paper mills in order to replenish stocks for the 1924 business.

This situation cannot be changed over night. It is an easy matter for the jobbers and consumers to write up orders for tonnage in one day, but production is another matter. The mills generally have been closed down and curtailing production for months past. By January 1st, the total operative capacity will not exceed over 50%, with the one exception of the newsprint mills. Even though orders do come through for large quantities of paper, it will be months before the mills can get back to a position of 70% capacity.

History repeats itself. Whenever the jobbers or consumers in this country, or both together, curtail their purchases in one year they make up for it in the following year. This happened in 1920 and 1921 when the production of paper went to a peak. It was curtailed 33⅓% the following year, and in 1922 it exceeded in many lines 1920, due to heavy consumption. The last six months of 1923 have witnessed a progressive curtailment of production and shipment into the market, but have also witnessed very heavy consumption.

The mills will be called upon in 1924 to replace the stocks that have been so depleted in 1923. This has always been the case in the past and will happen again in 1924. The markets are in good condition and by January 1st will be a "buy" all along the line. There have been no recessions in costs at the mill. Wages are high; labor in good demand; cost of raw materials as a whole remain static, but in spite of this, prices on January 1st will have declined to a point that will produce large buying.

The country has increased wealth; the crops have been generally bountiful and brought good prices. The population is increasing at the rate of 1,750,000 per year, and the per capita consumption is growing, particularly in paper, which is being used so generally as a substitute for cotton, wool, lumber and metals.

Congress has now convened. There are some misgivings about radical legislation, but even though the radicals in Congress are able to pass some radical legislation, it is the consensus of opinion that the President will certainly veto any measures which in his judgment and the judgment of the best business authorities would look to any interference with the prosperity of the United States.

DEPENDABLE OFFSET

This picture shows a workman in the plant of the Allied Paper Mills, Inc., Kalamazoo. Bowser apparatus (Richardson-Phenix type) is extensively used by these mills—and has proven "very satisfactory."

—illustration by courtesy of Allied Paper Mills, Inc.

The Experience That Insures Performance

Nearly 40 years' experience goes with every outfit that bears the Bowser and Richardson-Phenix labels—40 years of solving the problems of oil lubrication, distribution, filtration, storage, etc., for paper mills, large and small.

This comprehensive experience is yours for the asking. It is backed up by the guarantee of the Company that is oldest in solving these problems.

At your convenience, write to Dept. 8 for the several folders that tell what our organization has been able to do, in cutting oil-handling costs, decreasing fire risk, and conserving valuable oils.

S. F. BOWSER & CO., INC.

LUBRICATION ENGINEERS AND MANUFACTURERS

FORT WAYNE INDIANA

LUBRICATORS—FILTERS—COMPLETE CUTTING OIL SYSTEMS

"STANDARD UNITS INDIVIDUALLY ENGINEERED"

Accidents—the Exception

ACCIDENT prevention during the past year has made good progress in becoming more firmly rooted in the paper industry. A keener sense of responsibility has been awakened among employers and the practical application of this sentiment has helped to promote more harmonious industrial relations. Through increased good will on the part of employes and a substantial reduction in lost time accidents, greater production has been made possible.

The work of those active members in the paper and pulp section of the National Safety Council, who are devoting much time and thought to the perfection of a standard safety code for use in the paper industry, is worthy of great credit. The committee in charge plans to have this complete code ready for presentation and adoption at the next Safety Congress.

The safety problem is one of the great issues of the day, since the prosperity of any industry depends on the productiveness of its workers, which in turn depends to a large extent on their safety, health and welfare. It is the earnest hope and belief that the time is not far distant when accidental death and serious injury in industry will be the exception. The only thing that will bring it about, however, is an aggressive and persistent educational effort.

A Constructive Appeal

BELIEVING it is for the common good to prevent changes for which certain radicals are clamoring, we heartily join with President J. H. Whiting, of the Whiting Corporation, by submitting his statement as follows:

"Whatever may be said for or against the present Transportation Act, it is certain that a marked improvement in transportation by rail has taken place during the past two years.

"All previous carloading records have been broken during the present year, and the amount of equipment business placed by the carriers has been no small item in the general prosperity of 1923.

"The railroads are considered to be one of the largest users of raw and manufactured products, and therefore, have an important bearing on general business conditions.

"Considering the importance of the railroad group and the improvement made under the Transportation Act, it does not seem wise to us to make radical changes at this time, and we believe it only fair to continue the present arrangement until it has had further opportunity to demonstrate its merits or demerits.

"We urge you to communicate with your Congressmen and Senators, requesting their opposition to any radical changes in the Transportation Act that may be introduced in the next Congress. Ask your customers and friends to do likewise."

A Merry Christmas

DURING this Christmas season, The Paper Industry rejoices in expressing appreciation to the paper mill men who read our magazine, and to those who earnestly and faithfully interest themselves in the welfare of our great industry by writing helpful and valuable articles for our readers. Thanks are also extended to our advertisers, who have shown in the year past their appreciation for the thorough covering we accomplish in the pulp and paper manufacturing field.

We wish you all a Merry Christmas and a bright and prosperous New Year.

The DEVELOPMENT OF "HIGH SPEED NEWS"

An Epoch-Making Event

IN the development of "High Speed News" The B. F. Goodrich Rubber Company believe they offer something to the paper and pulp mill trade which will be so far-reaching in its benefits as to be recognized as an epoch-making event.'

This new Goodrich achievement has been made possible by late developments in the chemistry of rubber, through which we have produced a rubber press roll far softer than anything heretofore used, yet so tough and resilient as to lead to the following distinct advantages:

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2. Increased production
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6. Less felt washing
7. Longer press roll life
8. Less roll regrinding

The advantages claimed for "High Speed News" have been proven in actual service, and are available in some or all of these ways, to every maker of newsprint, catalog, book and bond papers. We urge that you write immediately.

THE B. F. GOODRICH RUBBER COMPANY, *Akron, Ohio*

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"*High Speed News*" RUBBER PRESS ROLLS

THE PAPER INDUSTRY

REG. U. S. PAT. OFF.

Vol. 5 DECEMBER, 1923 No. 9

Comparative Tests of Domestic and English Clays

By E. SUTERMEISTER

IT APPEARS to the writer that the use of domestic clays in the paper mills of this country has never reached the proportion that it should, and an analysis of the situation seems to indicate that there are a number of reasons for this state of affairs. In the first place, there are some plants so located geographically that English clay can be delivered cheaper than, or at least as cheaply as, that from the South, where most of the domestic mines are located. Such plants can be induced to use American clay only by proving its superiority in some important respect. In the second place, much of the domestic product formerly varied considerably in quality, both as regards color and the amount of gritty matter which it contained. This condition was probably brought about by the use of unsatisfactory or faulty means of purification by the clay producers, and by insufficient attention on their part to the requirements of the paper makers. Whatever its cause, it resulted in a prejudice against domestic clays which has been very hard to overcome, and which persists to this day in certain quarters, for it is not unusual to hear the opinion expressed that domestic clay cannot be used because it contains so much grit.

It has been the writer's opinion that deposits of satisfactory color would some time be discovered, and that methods of purification would be so developed that domestic clays would eventually replace imported brands very generally, except for the very highest grades of coating clay. It was also suspected that the domestic clays might possess characteristics which would adapt them to certain specialties, or permit them to develop certain characteristics in the paper to a greater extent than English clays. The following account is a description of work carried out to see whether these opinions were well founded.

The domestic clays examined were obtained from a number of different dealers, and included samples marked "crude," "crushed," "washed" and "refined." For obvious reasons, the source of supply of these samples is not given, but it may be stated that most of them came from South Carolina or Georgia. For comparison with these clays, three samples of high grade English coating clay were also tested, and the results included in the following tables.

Methods of Testing

Each clay was first examined for grit by washing a 20 gram sample on a 300 mesh screen with a gentle spray of water until no more would pass through. The residue on the screen was then dried, weighed, and reported as "grit." Obviously all coarse material is retained in this way, but its nature must be taken into consideration in judging the seriousness of the contamination, for a small amount of sand may be much more injurious for certain types of paper than a considerably larger amount of mica. Following the table of relative fineness are a few notes on the character of the material retained by a 300 mesh screen.

The next test applied to the samples was a separation into portions of different degrees of fineness. A liter beaker was marked on the side near the top, and again two inches below this first mark. A syphon was then made which would remove the water down to the second mark and automatically stop discharging. In carrying out the test, 20 grams of the dry clay were mixed with water and placed in the beaker, which was then filled to the upper mark and the time noted. At the end of two hours, the syphon was started and the upper two inches of clay suspension drawn off into a jar. The sediment was then stirred up, the beaker filled to the mark, and the process repeated until the upper two inches con-

tained practically no suspended matter at the end of two hours. All the fine clay thus drawn off was collected in a jar, made very faintly acid to cause the clay to flocculate, and the clay finally collected by settling and decantation. It was then dried, weighed and reported as that portion requiring over two hours to settle two inches. After removing this portion, that remaining in the beaker was treated as before, except that the time of settling was 10 minutes instead of 2 hours. Finally, a third separation was made, with a time of settling of 1 minute. This, together with the coarse part remaining in the beaker, gave a separation into four fractions which settled 2 inches in less than 1 minute, in 1 to 10 minutes, in 10 to 120 minutes, and which required over 2 hours. In carrying out this work, it was found that some of the clays broke up to a cream with difficulty, and it was found very beneficial to warm them with a little ammonia, as this caused the lumps to break up much more completely. It was proved by comparative tests, on a sample of English clay, that the addition of ammonia did not appreciably change the relative proportions of the various fractions.

Relative Fineness

The grit and flotation tests are given in the following table:

Clay		Grit on 300 mesh screen	Per cent settling two inches in less than 1 min.	1-10 min.	10-120 min.	over 2 hrs.	Per cent unaccounted for
Domestic,	No. 1	0.00	2.99	17.52	26.07	53.29	0.13
"	No. 1	0.29	2.02	14.04	26.48	57.14	0.32
"	No. 2	1.33	4.35	19.18	24.66	51.40	0.41
"	No. 3	0.57	0.91	8.39	20.37	69.96	0.37
"	No. 4	1.13	1.91	8.16	19.47	70.00	0.46
"	No. 5	0.69	2.34	7.29	21.99	67.20	1.18
"	No. 6	0.63	1.36	11.99	26.22	60.15	0.28
"	No. 7	1.18	2.11	8.90	22.37	65.89	0.73
"	No. 8	0.59	1.46	2.91	11.97	82.97	0.69
"	No. 9	0.12	0.22	6.23	23.41	70.04	0.10
"	No. 10	0.40	0.55	7.37	23.06	68.71	0.31
"	No. 11	0.36	1.89	2.78	8.44	86.16	1.23
English,	No. 1	0.78	2.05	23.70	32.54	41.70	0.01
"	No. 1	0.00	1.74	22.15	33.74	41.94	0.43
"	No. 2	0.10	0.14	11.24	29.52	58.68	0.42
"	No. 3	0.59	1.75	25.80	33.17	39.22	0.06

The two tests on domestic clay No. 1 were on two samples of the same brand submitted at different times; they indicate good uniformity in this grade of clay. The two tests on English clay No. 1 were on the same sample but one separation was made with, and the other without, the addition of ammonia. These show what concordant results the sedimentation process is capable of giving. English clays No. 1 and No. 2 are two shipments of the same brand received some time apart; it appears that this clay is subject to considerable variation in the proportions of fine and coarse material.

From this table it is seen that of the eleven domestic clays examined, nine contain more material remaining in suspension over two hours than any of the English clays, while all contain more than two out of the three English samples. If it is assumed that the most valuable part of the clay is that remaining in suspension over 10 minutes, then all but one of the domestic clays are better than the average of the English clays, while eight are better than the best of the English samples. It is, of course, possible that the examination of a larger number of English clays might change these comparisons somewhat, but the samples tested were considered very high grade coating clays, and there is no reason to suppose they were inferior in fineness to the average run of imported clay.

Looking at the other end of the scale it is seen that the grit, or rather the material retained on a 300 mesh screen, averages only sixteen per cent higher in the domestic than in the English clays, while only three contain more than the worst of the English.

On the whole, it appears that there is no reason for condemning the domestic clays for lack of finely divided material, and that where they show a slightly larger percentage of "grit," this could readily be corrected by more careful purification treatment.

Nature of Coarse Material

The nature of the material retained on the 300 mesh screen is fully as important as its amount. Small grains of sand, or true grit, are serious because they not only cause holes in the paper, but also cause wear of the wires and suction box covers. Mica, on the other hand, acts more or less as a lubricant, and, while it is not serious from the standpoint of wear on wires, it may give trouble by causing glistening specks or "shiners" in the paper. An examination of the grit from all of the clays showed hardly any mica in four samples, about one-third mica in the English clays, and amounts ranging from about 15 per cent to 65 per cent in the other seven domestic samples. In the English clays and in seven of the domestic samples, a considerable proportion of the grit consists of small lumps resembling clay in color and texture. These were a little too dense to be broken down by the washing treatment on the screen, but are not of an abrasive character and are, therefore, not serious. They can be crushed readily between slips of glass and do not show any tendency to scratch the latter; they would doubtless be completely broken up in the beaters. In four of the domestic clays, there was present in the grit more or less material of a vermicular structure, which was later identified by the Bureau of Mines as leverrierite. This material is soft and can be crushed readily between glass slips without scratching the latter. In only three of the domestic clays was it possible to find a few grains of sand. On the whole, it seems that domestic clays are quite free from grit of an abrasive nature, but that some improvement could well be made in the elimination of mica.

Color

At the time this work was carried out, no colorimeter was available, so it is not possible to record the color in numerical terms. In general, it may be said that most of the domestic clays have a reddish

or creamy tone, which is considerably improved by the addition of a little blue. From the standpoint of the book paper manufacturer, one clay would be classed as a rather low grade filler, nine would be considered medium to good quality fillers while one is nearly good enough to be classed as a low grade coating clay. Many of these clays are considerably better in color than the majority of the domestic clays which were on the market a few years ago, which may indicate that better deposits have been opened up, or that improved methods of washing and purification have been put into effect. While the color of the clay desired by different mills varies quite widely, it is safe to say that many of these clays are capable of being blued up to a color which is quite satisfactory for most filled purposes, and some would even prove acceptable for the lower grades of coated papers.

Loss on Ignition of Clay

The calculation of the filler present in paper is usually made by determining the ash and converting this to filler by applying the proper factor. This factor depends on the loss which the filler undergoes when ignited at a red heat, and it varies quite widely with different materials. For this reason, it seemed best to determine the loss on ignition of a number of the domestic clays in order to establish the factor which should be used to convert ash to filler. At the same time, the moisture lost at 105 degrees C. was determined, because it was known that air dry clay retained a small amount of moisture. The following table gives the results of these tests:

Clay	Air dry clay loses at 105° C. Per cent	Bone dry clay loses on ignition Per cent
Domestic, No. 1	0.47	13.56
" No. 2	0.45	13.47
" No. 3	0.73	13.36
" No. 4	0.68	13.33
" No. 5	0.95	13.20
" No. 6	0.54	13.55
" No. 7	1.06	13.18
" No. 8	1.16	13.50
" No. 9	0.96	13.17
" No. 10	0.94	13.05
" No. 11	1.02	13.62
English, No. 1	0.54	12.21
" A	0.62	12.14
" B	0.72	11.94
Avg. of domestic clays	0.81	13.36
Avg. of English clays	0.63	12.10

The uniformity of the domestic clays, so far as loss on ignition is concerned, is rather remarkable. The English clays appear to be about equally uniform, but with a loss on ignition about 1¼ per cent less than the domestic. From these tests it appears that the ash found in a paper may be converted to filler by dividing by 0.866 if the clay is of domestic origin, or by 0.879 if it were English.

Retention Tests

When considering the use of clay as a filler, the proportion of that added to the beater which appears in the finished paper, or the "retention," is an important point to take into account. Since it appeared quite possible that the fineness of the clay might have a marked influence on the retention, it was determined to run small scale tests, using as fillers a series of clays selected because of the varying proportions of fine material. The apparatus used was a small laboratory size beater, and the furnish was as follows: **50 grams bleached sulphite fiber, 50** grams bleached soda fiber, 32 grams dry clay, 90 cc size emulsion, 5.2 grams alum.

The order of addition and the time of treatment were the same in every case, and the only variable was the kind of clay used. The treatment in the beater was merely that of mixing very vigorously, for the beating action could not be controlled accurately enough to be sure that the same effect was obtained in every case. After the preparation in the beater, the stock was diluted to a definite volume and sheets made on a sheet machine, using such a volume of the diluted stock that a 70-lb. paper would result. These sheets were pressed and then dried on a cylinder heated by steam at 10 lbs. pressure, after which they were allowed to season in the air. Four sheets of each lot were selected, cut to size, weighed and tested for sizing by the ink flotation method. A composite from all four sheets was used for the determination of the ash.

To obtain a basis for computing the retention, a portion of the stock removed from the beater was dried out and the ash determined in the air dry material.

Four of the clays included in the previously mentioned work were used in the retention tests, and, in addition, a fifth sample was also tested. This was a clay which was claimed to be "absolutely gritless," and which was found to contain 99.5 per cent of material which would remain in suspension over two hours. The results of these tests are found in the following table:

Clay	Per cent in suspension over 2 hours	Per cent ash in stock	Per cent ash in paper	Average lbs. per ream	Average ink test seconds	Retention per cent
English, No. 1	41.8	20.78	8.27	69.0	171	33.0
Domestic, No. 2	51.4	20.97	8.41	68.1	125	33.3
Domestic, No. 3	70.0	20.75	8.41	69.2	85	33.9
Domestic, No. 11	86.2	21.78	8.39	69.9	45	31.1
Gritless	99.5	21.31	8.51	69.5	49	31.1

In calculating the per cent retention, a correction was made for the ash in the fiber used and for that which would be derived from the size and alum added. The exact method of calculation is not given, because it is not considered material; the point to be noted is that when calculated in the same way, the retention varies only very slightly for clays containing very different proportions of fine material. For all practical purposes, it may be said that the retention of a clay is independent of the proportion of very fine material which it contains.

In this connection it is interesting to note the re-

sults obtained by W. M. Weigel* in a series of tests which he carried out on Georgia clays. When the clay used amounted to 20 per cent of the weight of the fibers, the retention ranged from 40.7 to 52.8 per cent, but in 23 cases out of a total of 31, the figures fell between 45 and 50 per cent. While the relative fineness of his clays is not known, it is quite evident that the nature of the clay has comparatively little influence on the retention.

When it comes to a question of sizing it is seen that the fineness of the clay plays a very important part, for as the proportion of very fine material increases, the ink resistance of the paper decreases quite rapidly. It is quite possible that variations in the quality of the clay may account for some of the mysterious changes in the sizing of the paper, which occur in many mills with disconcerting frequency.

Use in Coating

The color of some of the domestic clays was found to be good enough to suggest their use in certain grades of coated papers, and this in turn naturally brought up the question of how the fineness affected the amount of adhesive required and the working properties of the coating mixtures. This was tried out by making up coating mixtures with a high-grade casein, and determining the amount of the latter required to hold the clay on the paper with sufficient strength to stand the usual test with sealing wax. Four clays were selected for these experiments and the results were as follows:

Clay	Per cent in suspension over 2 hours	Casein required; parts per 100 clay
English, No. 1	41.8	Slightly over 4
Domestic, No. 1	57.1	5
Domestic, No. 3	70.0	Slightly over 6
Domestic, No. 11	86.2	8

The clays acted very differently when being made into the coating mixtures. The English clay worked up well with water and the final coating mixture was of the desired fluidity and consistency. As the clays increased in fineness, the thickness of the mixture, both with and without casein, increased very rapidly, so that in the case of domestic No. 11, the coating could not be applied with the usual types of coating machines without further dilution. This point is one which should be looked into carefully if domestic clays are to be considered for use in coating paper.

* Georgia Clays for Paper Fillers: Paper Trade Jour., Aug. 9, 1923.

The First Paper Made in Canada

By J. C. CORCORAN

THE progress of civilization of all countries has been and always will be measured by its consumption of paper. It is a well known fact that during the time of Assyria and Babylon, the progress of these two nations depended upon their writings of historical facts as well as the daily life of their citizens, as registered on slabs of clay. This institution or invention of the Euphrates Valley was afterwards communicated to the higher civilizations of Assyria until it reached Egypt, where about 4000 B. C., writing in cuneiform on clay tablets reached its highest perfection.

About this time Atholthon, the most enlightened pharaoh of Egypt, founded the city of Acton of the Horizon, several miles south of Thebes on the plains watered by the Nile River. There was discovered by the priests and learned men of Egypt a certain wasp which built its nest on the sand rock cliffs of the Nile, interlapping fibres of cottonwood growing on the banks of the Nile and forming a nest not only impregnable to water but almost weatherproof. The durability of this formation appealed to these learned men and they commenced to study and experiment to produce a like material. As they worked, they discovered growing on the banks of the Nile a plant which they called papyrus, and by interlacing these fibres they secured a paper which has come down to the present generation as practically indestructible, and from their discovery the name of paper has been obtained.

Since this discovery the history of the progress of nations has been traced down rapidly from records on parchment and other materials which are practically indestructible, and there is no subject which bears upon the progress of any nation so much as the discovery and manufacture of paper, because on paper alone remain the records of human thoughts, human actions and progress to be preserved for the perusal of generation after generation.

In the building up of a new country, one development which appeals to the human imagination is the erection of the first paper mill and the making of the first sheet of paper. Canada, like all other countries, had to have its first paper mill. This paper mill is fully described in a topographical description of Lower Canada, as written by Mr. Joseph Bouchette and published in London during the year of 1815. In this description he enumerates all the industries on the north side of the Ottawa river which were situated in the seigneury of Argenteuil. They consisted of two flour mills, two saw mills and one paper mill. The paper mill was the only one in the province where

large quantities of various grades of paper were manufactured under the direction of the proprietor, Mr. Brown, who was a publisher of Montreal.

The paper mill mentioned above by Mr. Bouchette, which was located at St. Andre d'Argenteuil, was the first of its kind, not only in the Province of Quebec but in the whole of British North America. This mill was started during the year of 1803 and proved to be a great benefit, not only to St. Andre d'Argenteuil but to all the surrounding country, as it used rags and straw in the manufacture of its paper instead of pulpwood and the products of pulpwood, as is done at the present time.

A Short Synopsis of the Industry

A few years after Mr Bouchette's description, a Mrs. Thompson wrote a history of the counties of Argenteuil and Prescott, and in her notes she reproduces Mr. Colin Dewar's description of the paper mill at St. Andre d'Argenteuil. A synopsis of this industry as published by Mrs. Thompson is as follows:

"During the year of 1802, certain gentlemen, who were acquainted with the manufacture of paper and who had been connected with paper mills at Newton Upper Falls, Mass., came to Canada at the invitation of Mr. Jas. Brown of Montreal, to discuss with him the advisability of establishing a paper mill in Canada. As these gentlemen were well acquainted with the processes of paper making as then existed, and as Mr. Brown had the necessary financial resources, a company was organized and a mill built. This mill was located at what is now known as St. Andrew's East., Que. Certain concessions were obtained from the seigneury of St. Andrew's, such as water rights. lands, and a term of years under which to operate this mill. As Mr. Brown was the financial head in the proposition, the mill was known as the Brown Paper Mill. A canal was excavated to supply the water power; a dam was built from the east bank of the river to the end of a little island, where many of the original logs and foundation stone of the dam can even at the present time be seen. The construction of the buildings necessary for this mill required a considerable amount of wood. To take care of this the company built a saw mill during 1802 at the head of the canal, extending along the riverside near where a church at St. Andrew's is now built. The paper mill was built where a store now stands which was recently occupied by Mr. Alex. Dewar.

"One of the leading advantages of this industry to the seigneury of St. Andrew's was that it employed many men, girls and boys. The saw mill and paper mill were carried on for many years and were a source of great revenue to the village and surrounding country. This mill served a large population and was considered one of the finest industries of Lower Canada, and was pointed out with great pride by the people of that section.

"As the contract between the owners of the mill and the seigneury of St. Andrew's existed for only thirty years, in the year 1834 this mill had to cease operations and the dam was broken up. This was considered a calamity by the people of St. Andrew's, as well as Montreal, and during the summer months several propositions were put forth for the reconstruction of the dam, but the seigneury, jealous of the prosperity this undertaking had met with, were much opposed and threatened procedure should anything be done. Therefore, this industry was allowed to pass and become only a matter of history. After two or three years of litigation and other difficulties, everything was settled, the seigneury purchased the property, but it remained idle."

However, the desirability of the location and the high quality of the water of the North river could not remain forever unnoticed, and during the year of 1823 a company has been organized to resurrect this industry at St. Andrew's East. A new mill is now being built practically on the same spot where the first paper in Canada was made. This new mill will manufacture a paper which has never before been made in Canada, having up to the present time all been imported into this country, and without a doubt on this paper will be recorded the history of many future generations.

Starch for Paper Manufacture

BY FOREIGN CORRESPONDENT

SOON after the outbreak of the world war, starch, which made up an essential part of human food, was excluded by several countries for papermaking. Its use has been known to the expert for several years and articles have appeared in various trade journals on the use of starch in papermaking. That starch improves the quality of most sorts of paper is undisputed.

The starch, which by heating is transferred into a swelled state, is added to the mixture in the rag-engine. Thus the minutest fibres are kept back better than without the starch. All papers impurified by mineral substances lose strength, and this loss is made up by the addition of starch. Thus we substitute a portion of the valuable cellulose by a cheaper filling material. The starch keeps back a large part of the glue substances in the paper, which is of advantage at the subsequent sizing. When pigment dyes are to be employed, starch is indispensable.

There is a tendency to find a substitute for resinous glue. The latter cannot be fully replaced by starch with writing papers or such, which shall be unpenetrable against liquid inks. But here at least one-third of the glue is saved, and yet the sizing is good. It should be remarked that a small portion of the starch added to the rag-engine gets lost, and therefore it is more economical to add it together with water-glass having been swelled. Writing pa-

pers receive improved sizing, harder touch and increased strength. Erasures will not spoil it. If unstarched paper is erased with the knife, fibres will form and the surface spoiled. A good process is the following: a wooden or steel vessel holding 200 litres is filled two-thirds with water to which 4 to 6 litres water-glass are added. As it has a greater specific weight, a steam jet must mix it, which takes three minutes. The water becomes lukewarm, which is advantageous for the starch. Of the latter, now 40 to 60 pounds are put in and stirred a little; the steam competes the agitation. The latter is admitted until the mixture just becomes a thick paste. Cold water prevents a further swelling. When the mixture is fresh and warm it should be put into the rag-engine.

As regards printing paper, the application of starch is not new. Some experts propose the addition of potassium silicate. This way of sizing has been tried for fifty years, but never with success. Experiments will show that the deposit has gluing or sticking properties, but when such a mixture becomes dry again, it crumbles like dust and the silicate plays the part of a filling material, which, however, is too expensive. But the reaction assumes quite a different nature if soluble glass is swelled together with starch, after which it is deposited with aluminium sulphate. A ball formed from such a deposit remains uniformly solid and becomes tough like horn, after drying. The deposit arising in the paper-engine fixes the filling substances and avoids any loss in strength. This has been proved by various experiments at larger scale in factories for printing paper. Such paper must show a good absorption for the oily and greasy printing ink. Resinous glue does not possess this ability and is not suitable for printing paper. The applicaton is as follows: a wooden or metal tank holding 200 litres is filled one-half or two-thirds with water, to which 20,160 pounds soluble glass is added. The mixing is done with the steam jet, as said before, then 20 to 60 pounds starch is added; the stirring by hand and steam is continued until the mass becomes a paste. The steam must not act too long; cold water prevents further swelling. During this process many accidents have happened through burning, so great caution is needed. The above amount suffices for 1,200 pounds contents of the rag-engine. The filling material must be put in early, the starch later, the alum finally.

For surface sizing formerly animal glue was exclusively used; only such sorts which slowly swell are suitable. Thus glue shows several drawbacks, increases the turning yellow, smells unpleasant and is expensive. Certain starch modifications are so much soluble in hot water that they form a thin solution, which becomes thick only at lower temperature. They become hard, solid, and almost unsoluble when fully dry. If we send a paper sheet through a 5 to 7 per cent. bath of such a starch, we obtain almost the same effect as animal glue. Still the latter has a greater strength and experiments going on for months have shown that a third of the usual portion of glue, together with a 5 to 7 per cent. starch solution, gives the best results. Two per cent. alum should be added to render the mixture more durable.

Concerning art paper, at first glue and later caseine has been used. This has an unpleasant smell, besides it causes frequent trouble. Both can be avoided if changed starch in connection with the above reaction is employed. Besides the whole cost is one-half of the caseine and the manufacturing process simplified. Paper sized with starch absorbs better and is not brittle. Every change in the process in a larger plant is some risk. Just as this was the case when glue was replaced by caseine, the same applies when the latter is substituted by starch. On the other hand, there are many advantages, as just described. We can also make a compromise and work with mixtures of caseine and starch-water-glass and modify the absorption qualities by using more or less caseine.

For pasting several sheets together to make cardboard, two different kinds of starch can be employed, thin, ordinary starch and a soluble one. The latter is to be increased if we want more stiffness. We shall have then much sticking matter in little water, and of the latter not so much need to be evaporated, which means a saving in fuel.

It has been observed that raw starch was put into the rag engine. Unless the starch contains a filling material, the yield will not be large. It is therefore advisable to add besides the raw also a swelled one. If the former is put in, it means a waste, except for paper of great weight. Raw starch swells only on the drying cylinders, where the grains split by heat and water. The grains dry again and paste various fibres together. Starch increases the strength, water-glass the percentage of filling matter.

Eliminating Fatigue

By WILLIAM R. BASSET

President of Miller, Franklin, Basset & Company, Inc.

IT HAS been calculated that, on the average, every workman, each day, turns out 20 cents worth of product less than he might, because of unnecessary fatigue. Multiply that by the number of workers you employ and then by the number of working days in a year and you will be astonished at the total cost to you.

Much of this fatigue can be eliminated.

In one plant as a result of a study, the working day was shortened 45 minutes, proper rest periods allowed and methods of doing work improved. The result was an increase of 35 per cent in the daily production. Similar results have been achieved in many plants.

Anyone doing an operation over and over tends to

strike a rhythm of movement, which, when found, greatly reduces the fatigue. Inability to find the proper rhythm may result in greatly reduced production. For this reason a rapid pace may be less tiring than a slow one, if it meets the rhythm of the worker.

The common causes of unnecessary fatigue are:

1. Poor light.
2. Awkward position.
3. Noise.
4. Improper tools.
5. Too high or too low speed of working.

I have seen production of bench workers increased 22 per cent merely by raising the light of the stools two inches. Unnecessary noise has been found to be very tiring.

For the sake of increased profits, if for no other reason, it pays to study the methods of doing work, so that needless fatigue may be eliminated.

Peat as Raw Material for Paper

BY FOREIGN CORRESPONDENT

SINCE in most countries, where paper is manufactured, the national forests are not large enough to supply the required wood, efforts are being made everywhere to find substitutes. When observing the peat, it seems that it could become a suitable raw material for paper, as it resembles certain half-finished goods of that industry. The peat fibres are of vegetable origin—viz., reed, Cariceae, Epiphorum, and especially the Sphagnaceae. These are rather large, light grey mosses growing like cushions on swamps and moor forests. The light color is caused by the large, airy cells, alternating with small ones containing chlorophyll. With these cells the moss sucks in water like a sponge.

Science knows about twenty of such mosses, found all over the globe. Their formation goes on uninterruptedly, and the withered plants are replaced. The peat process commences with the formation of putrid mud, a green, slimy skin is produced on shoal quiet waters. The skin sinks down gradually and combines with the micro-organism and some mineral substances. A number of plants grow on this mud and become peat after their withering. A real flat moor is in the process of formation, mixed with felt-like vegetable matter reaching with the roots, the soil, while the water gradually disappears. The mass is called humus peat. When such moors are flooded by some cause, the whole process continues, and the moor increases in thickness. The lower layers are then real peat, and the deeper we get into the soil, the blacker and more valuable is the peat, developing the greatest heat, exactly as is the case with anthracite, black and brown coal. The upper layers are brown and show distinctly the vegetable origin. They are the best material for paper manufacture.

The composition in percentage of weight, in relation to the pure substance—viz., the peat free from water—is: 55-60 per cent carbon (C), 5-6 per cent hydrogen (H), 35-39 per cent oxygen and nitrogen (O+N); the theoretical heating value is 5,000 to 5,700 calories. The Northern hemisphere contains by far the most peat moors, especially Europe. We find them chiefly in Russia, Finland, Sweden, and Germany. The production is still mostly done by hand, but machinery is being introduced. In the marshy areas it is much used as fuel and litter, but partly also as a textile material. The fibres have little strength, the mass is easily dissolved when wet, but becomes hard and brittle when dry. By the peating process, which represents an oxidation or putrefaction, the long and strong fibre loses its strength and changes the color. It will not stand the usual treatment of other fibres. The bleaching would cause excessive costs. But the upper layers of a peat moor contain also numerous undestroyed remainders of plants which are suitable for paper manufacture. This mass must be subjected to a certain process, as the usual methods, grinding in the rag-engine, etc., are not applicable. The peat demands a very careful treatment, and at present no economical, really practical method has been found. Quite a number of inventions have been made and patents obtained, and the following description is only a selection.

Some employ fenders, with points which pick up the fibres. Others use water for rinsing, also sieves which are tilted. Violent treatment, with teeth, rollers, etc., is mostly avoided, as the peat fibre is too delicate. Another inventor uses stamping devices for crushing the peat and dissolving it into fibres. As the latter are hard and brittle, the various dry processes are not recommended. In the wet ones the fibres remain more flexible, and the separation from other substances is facilitated. There are two ways: it is desired to obtain the fibre perfectly pure by freeing it by assorting, washing, bleaching from all matter unsuitable for paper-making; or the peat is crushed and divided into its fibres without removing other matter. It seems that the first method is better, yielding a more valuable fibre, although the exploiting is less.

Difficulties are experienced with the water and the remainders. The latter can be easily removed in the dry process and can be pressed into briquets to serve as a fuel. In the wet process considerable quantities get lost flowing off in the used water. The latter must be led into basins, where the peat mud is deposited, which passes then through filter presses, is dried and used as a fuel. It serves also as fertilizer, as it contains much nitrogen. But the peat fibre, even if perfectly pure, cannot be applied as sole raw material for cardboard, and still less for paper. It will, however, do good service if mixed with other fibres, but the disadvantage remains that

light paper and cardboard cannot be manufactured. If it was possible to make a strong, pure, peat pasteboard with sufficient resistance against mechanical influences, it would find an extensive application for heat and cold protection. In this respect peat stands on the same level as cork. Such insulating cardboard need not have such a strength as the other sorts.

It should be noted that the peat fibre tends to stick to water having an oily character. Peat fibre alone, therefore, offers great difficulties, and it is much better to mix it with others. The extraction of water will even then be more difficult than with other fibres. The drying requires more heat, longer time and more cautious treatment. On account of the high percentage of water, the whole process is worth trying only in moorland areas, as the shipping by rail is far too expensive. Too much water would have to be transported needlessly. Artificial drying before shipment is also too expensive.

There remains the question whether the peat moss (sphagnum) can be utilized otherwise. It allows bleaching, since already the sunlight is sufficient to render it white. It would be necessary to invent a suitable chemical or mechanical process for securing the fibre in an economical way. Since these fibres are not long, they will hardly be applicable if used alone, but will do good service in connection with other fibres.

The securing of them will be favorably influenced if the fuel is near at hand at reasonable price. Also good water must be available. In moorlands there is enough water, but in the natural state it is unsuitable for paper manufacture. The dark color can be improved by filtering, the other detrimental chemical properties require special treatment.

Silicate of Soda in the Paper Industry—a Review

Sizing

By WILLIAM STERICKER, Ph. D.
Philadelphia Quartz Company

ACCORDING to Blasweiler, there have been sporadic attempts for over forty years to use either sodium or potassium silicate as substitutes for rosin in paper sizing. It was not until 1907 that Klemm[1] pointed out that both silicate and rosin might have a place in paper. Sizing is frequently considered to mean the resistance to the penetration of aqueous inks. This is not a satisfactory standard for printing papers, since printers' inks are actually oil varnishes. Rosin sizes against aqueous solutions but not against oily liquids. Silicate is valuable for the latter. Although sixteen years have elapsed since Klemm's article appeared, the distinction is not fully recognized in the paper trade even now.

Method

The method of using the silicate depends to a large extent on the kind of paper and the regular practice in the mill. The following[2] has been found to give maximum retention in many cases. It is also advantageous because it interferes to the least extent with the routine of the mill operation. The silicate is added to the pulp in the beater before any color or other size has been added. Sufficient alum[3] is then added to precipitate the silicate and the rest of the process carried out as if there were no silicate present. Sodium metasilicate[4] is of no value for this use, while the higher the ratio of silica to soda in the silicate solution, the better results are obtained.[2 5]

Effects

In discussing the use of trimmings from corrugated and solid fiber board as part of the beater furnish, Burt said the silicate present was injurious to the size. He claimed there was 7 per cent of silicate in such trimmings.[6] Vail[7] replied that this was only the case when insufficient alum was used. If enough were added, all the silicate would be precipitated and slack sizing would be avoided. In addition, the silicate would increase the retention of the rosin and improve the hardness and finish of the paper.

An individual, who prefers to be known as "Greaseproof," gives[8] the following description of the effect of silicate. When acids or acid salts are added to soluble silicates in the beater, silica is precipitated as a gelatinous hydrate. This permits the pulp to carry more water onto the machine and hardens the paper. Vail[2] has given a more extended description of the effects of silicate. These results are based on mill tests with large quantities of paper using 2-4 per cent of silicate. There was an average increase

[1] Wochbl. Papierfabr. 38, 1893-5 (1907).
[2] Vail, Paper 29, #6, 19-20 (1921); Paper Trade J. 73, #17, 32-4 (1921); Chem. & Met. Eng. 25, 823-4 (1921).
[3] The term "alum" is used for aluminum sulfate or "papermakers' alum" throughout this report.
[4] Blasweiler, Papierfabr. 19, 809-16, 875-7 (1921); Paper 28, #22, 20-2, #24, 20-2; 29, #6, 19-20.
[5] Papeterie 43, 1058-66 (1921).
[6] Fibre Containers 6, #2, 14 (1921).
[7] Ibid. #3, 16.
[8] Papeterie 43, 1058-66 (1921).

of 12 per cent in the Mullin test. The ink resistance was increased, probably due to the increased retention of rosin.[9] If the silicate is carefully added to the correct time, there are no deleterious effects on the colors. When no rosin is used, discoloration on aging is minimized. The hardness, rattle and finish of the sheet are improved.

Blasweiler has carried out a long series of experiments under the direction of Emil Heuser, one of Germany's greatest paper and cellulose experts.[10] He used $Na_20.3.3Si0_2$, using from 5 to 30 per cent of silicate. The experiments were made in a 30 liter hollander using 2.5-3 per cent of pulp. The results found confirm and extend those previously mentioned. In every test the tensile strength of the paper made with silicate was increased. The maximum was 18.5 per cent, which was obtained with newsprint. The hardness and rattle or snap were greater. The finish and feel were improved. The suction on the paper machine was good and there was no sticking on the pressure rolls, so less water could be used. The suspended matter in the back-water settled rapidly and completely. The colors were brighter and did not fade as rapidly on silicated papers. The cut paper laid flat and the behavior with printers' ink was improved. The silicate also increased the retention of loading materials.

Straw Paper

A. R., who translated this work into French, was led to tell of his own experience with silicate in sizing straw paper.[11] In order to speed up production, the digestion of straw was carried out under high pressures. This causes hydrolysis and porous paper resulted. When meat was wrapped in it, the paper soaked and tore easily. Since most of the sales were to butchers, a method of sizing had to be found. Rosin could be used but was too expensive. Equally good results could be obtained by the use of 10-2 per cent of silicate precipitated with alum. The former method cost more than 400 francs, the latter about 60.

Alum

Blasweiler [10] found it advisable to add enough alum to make the solution distinctly but not strongly acid. In spite of the fact that sufficient alum to precipitate the silicate seems necessary in order to secure any good results, there are mills which consistently use silicate without any alum to take care of it. They apparently secure effects that they can detect and which they believe pay for the silicate. In some cases, this is because of special qualities not directly connected with the paper. When alum is not used, the back-water is returned to the machine. This is good practice in any case as the effect of the silicate seems to become cumulative in this way. One hundred pounds of "A-Syrup" ($Na_20.3.3Si02$) require about 30 pounds of alum and 100 of "S" Brand ($Na_20.3.9\ Si0_2$) require 25 pounds. In case the water is very hard or contains some acidic material, these amounts may be excessive. The intentional addition of salt or magnesium sulfate does not pay for itself. [10]

Alum Substitutes

Frohberg[12] proposed the use of magnesium sulfate of alum, but Blasweiler found that it did not give good results in the presence of paper stock. Any substitute has to compete with the additional sizing effect due to the aluminum hydrate or silicate formed by the interaction of alum and silicate. Klason[13] used sulfate waste liquor to precipitate the silicate. The rattle and finish were improved, but the paper was yellowish. Franck has patented the use of fluosilicates as precipitants. So far as is evident they are not actually used. It is claimed[14] that silicate and alum may be used as a dry powder. The silicate is sprayed on solid aluminum sulfate and the mixture is then dried and ground.

Rosin

When both silicate and rosin are used, the paper is sized for either aqueous or oily liquids. In addition, the use of silicate increases the retention of the rosin. Usually the silicate and the rosin are added to the beater in their usual form, but there have been a number of proposals to combine them. Kuldkepp and Graf[15] mixed rosin and silicate in the cold to prevent the precipitation of silicic acid. Sommer[16] found that finely pulverized or emulsified rosin would dissolve in dilute silicate solutions. "Greaseproof" says that boiling silicate solutions dissolve powdered rosin, forming a size similar to brown rosin soap.[8] It is important to use no more silicate than is necessary. The writer's work indicates that rosin dissolves more readily in the more alkaline silicates ($Na_20.2Si0_2$). When hot concentrated solutions of $Na_20.3.3Si0_2$ were used, there was always a separation of rosin soap.

In 1920 Clapp proposed the use of freshly precipitated calcium silicate and aluminum resinate as a size for counter board.[17] The size was formed by the reaction of hydrated lime, sodium resinate, silicate of soda, and alum.

Bakelite

The use of silicate with bakelite for sizing has been patented in Germany. It is claimed that good results were obtained.[18] West[19] says that the bakelite is

[9] Possibly due also to an increased hydration of the fibers.
[10] Papierfabr. 19, 809-16, 875-7, 992-7, 1108-11, 1217-23 (1921). A condensed translation by West appeared in Paper 28, #22, 20-21; #24, 20-2; 29, #6, 19-20. The original articles have appeared as a book, "Die Verwendung von Wasserglas zum Leimen von Papierstodd." (Elsner, Berlin, 1922.)
[11] Papeterie 43, 1077; 44, 58-61 (1922).
[12] Wochbl. Papierfabr. 44, 4250-2 (1913).
[13] Papier-Ztg. #34, 1315 (1907?).
[14] Papermakers' Monthly J. #4, 122-3 (1911).
[15] Ger. Pat. 245,975.
[16] Ger. Pat. 257,816.
[17] U. S. Pat. 1,345,317 (6-29-20).

used to bind the precipitated silica to the fibers, but it seems more likely that it acts like rosin. Unless it shows decided advantages, bakelite will be too expensive to be practical.

Starch

In 1910, Fues[20] applied for a patent on the precipitation of starch for sizing paper in the presence of silicon compounds, but Klemm was able to show that he had previously used silicates with starch. Wrede[21] found that silicate and starch were better than silicate alone for sizing against non-aqueous materials. Since silicate is cheaper than starch and increases the retention of the latter, its use is advisable. The mixture increases the strength and rattle of the sheet and the retention of any filler. Fues claimed to be able to secure practically quantitative precipitation of the colloids at exact neutrality. Wrede recommended a strong excess of alum, but only recovered 60-70 per cent of the starch.

In a later article[22] Wrede claims that starch not only improves the quality but reduces the cost of manufacturing paper. It is most economical to swell the starch, add silicate, and then put the mixture in the beater. When used in writing paper, this mixture increases the strength and gives a better finish and a harder feel. Since the paper is harder and tougher, it stands erasure better. For this kind of paper it is recommended that the silicate and starch be added after the rosin size has been precipitated. In print papers it should be added after the fillers. In all papers where raw starch is used as a filler, 2-4 liters of silicate should be used with each kilogram of starch.

Soaps

Kolb claims[23] that soaps, especially the stearates, may be used to replace rosin size. When used in connection with sodium silicate, they give pronounced size-fastness and good feel. The silicate increases the sizing action by increasing the surface area of the other materials. Blasweiler investigated both soy-bean and cottonseed oil soap with and without silicate, but was unable to find sufficient improvement to pay for their use. For example, 5 per cent of cottonseed oil soap, 5 per cent of 38° Beaume' silicate ($Na^20.3.3Si0^2$), and 10 per cent of alum increased the tensile strength but decreased the stretch of the sheet.

Glue

Muller[24] dissolves one part of glue in 6 of water, using the usual method. While the solution is still warm, he adds a solution of 1 part of 38° Baume' silicate in 8 parts of water. When the solution has cooled, he stirs in a solution of alum. An excess of alum has to be avoided so the mixture is not completely precipitated. This material is added to the furnish followed by enough alum to give a faintly acid reaction. Muller considers that the fibers are coated since the brilliancy, the handle, and the fullness of the paper are improved. In addition, the retention of the fibers and loading materials is greater. Other colloids may be used in place of glue and acids or acid salts in place of alum. In any event the size would be produced before the pulp is present.

Other Materials

Kuldkepp and Graf[15] have patented mixtures of casein or casein-like substances with silicate. Stein[25] has covered the use of algin with inorganic colloids. Possanner found silicate in a number of commercial sizes sold in Germany.[26] Humic acid is said to give satisfactory sizing when used with silicate.[27]

Fillers

All the investigators find that silicate increases the retention of loading materials. Reichard obtains two distinct effects by the use of silicate.[28] Ordinarily when very heavy materials like barium sulfate are used to load paper, a large proportion settles out. If silicate is added to the suspension, it acts as a stabilizing medium. When the silicate is precipitated in the beater, it carries the loading material into the paper. Magnesium chloride is preferred as a precipitating agent.

Blasweiler included experiments on newsprint containing 80 per cent mechanical wood pulp and 20 per cent bleached Mitscherlich pulp. The use of silicate increased the retention of the china clay used as a filler and, at the same time, increased the tensile strength and improved the color.

Paper for wrapping oranges and lemons was made[29] from 30 per cent white paper trimmings, 10 per cent fine white ground wood, 30 per cent unbleached Mitscherlich, 20 per cent semi-bleached sulfate, and 10 per cent waste paper. About 1 per cent of silicate was added and precipitated with alum. Approximately 5 per cent of talc colored with eosin was also used. The talc was credited with giving the paper a smooth feel and preventing molds. It seems likely that the silicate helped in these effects. The use of silicate in connection with talc is also mentioned in a patent to Altmann.[30]

Color Lakes

Silicate is not only used to increase the retention of loading materials but also of colors.[31] When sili-

[18] Holzverkohlungs-Industrie Akt. Ges., Ger. Pat. 338,396 (1921).
[19] Paper Trade J. 73, #15, 52 (1921).
[20] Wochbl. Papierfabr. 44, 1223 (1913).
[21] Ibid 835-41.
[22] Papierfabr; Paper 31, #12, 11-4 (1923).
[23] Papierfabr. 19, 1141-4 (1921).
[24] Ger. Pat. 317,948 (1920).
[25] Aus. Pat.
[26] Chem.-Ztg. 38, 100 (1914).
[27] Ger. Pats., review by West, Paper Trade J. 75, #1, 55 (1922).
[28] Brit. Pat. 177,137 (11-24-21); see also Fr. Pat. 543,763; Paper 31, #20, 20.
[29] Papeterie 41, 634 (1919).
[30] Ger. Pat. 288,106.

cate is precipitated by the action of magnesium or aluminum sulfate or calcium chloride in the presence of a dye, the dye will be strongly absorbed if it is basic, weakly if it is substantive, and not at all if it is acid. The magnesium precipitate is best for basic dyes and the aluminum one for substantive dyes with the calcium intermediate in both cases. The dyes thus held are quite fast, but the acid ones wash out. The retention of silica is greatest when alum and a basic dye are used. Color lakes of this type are on the market in England.

Coating and Tub Sizing

Artus[32] was the first to propose the use of silicate of soda for coating paper. He treated moderately strong writing paper with two coats of silicate of unknown composition diluted to 15-9° Beaume' (sp. gr. 1.12-1.15). The first coat was allowed to dry before the second was applied. Paper treated in this manner could be used for packing salves and plasters. Concentrated silicate solutions gave a beautiful glassy coat, but the paper broke when rolled. Silicate is now widely used for grease-proofing paper. It is also used as a preliminary coat under paraffin to reduce the consumption of the latter. For this work 35° solutions of $Na_20.3.3Si0_2$ are used.

Although silicate alone will grease-proof paper, Cavanaugh[33] has patented a paste composed of 11 pounds of silicate, 4 ounces of mica, 10 glycerol, 3 of powdered dextrin, and sufficient precipitated chalk to thicken.

Waterproofing

Paper is usually waterproofed with paraffin alone or paraffin over silicate. It is claimed[34] that it can be done by passing dry paper through a bath of a hot mixture containing 50 per cent resin, 45 per cent paraffin, and 5 per cent silicate. The proportions of resin and paraffin can be varied up to 10 per cent.

Tub Sizing

Wezel[35] dissolved horn shavings in caustic soda and added silicate. This solution was mixed with potato starch and then nearly neutralized with acetic or a dilute mineral acid. The mixture was then used as a tub size.

Size and Adhesive

Morrison[36] developed a size which can also be used as an adhesive on wallboard. It consists of 3-15 per cent silicate of soda,1-7 per cent glue or other organic adhesive, and 1-8 per cent pottery clay or other filler. In no case should the organic adhesive exceed the silicate. This size gives a higher Mullin test, decreases the absorption of ink or paint, and excludes moisture. Morrison soaked 37.5 pounds of high grade glue for 36 hours in 75 gallons of cold water. He then heated the mixture to 130-60° F. for 15 minutes, slowly, and added 25 gallons of 40° silicate while stirring. After this 29 pounds of pottery clay were worked in. If desired, the silicate and clay may be mixed and then added to the glue solution.

De-Inking

Silicate has been used in de-inking paper.[37] If the ink has a mineral oil base, hydrated lime is said to aid in the process.[38]

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[31] Heuser und Behr, Papierfabr. (1923) 1-6; Paper 31, #18, 7-12 (1923); Heuser, Paper Maker 64, 433 (1922).
[32] Chem. Zentr. 28, 749 (1857).
[33] U. S. Pat. 1,357,844 (11-2-20).
[34] Papier 22, 358 (1919).
[35] U. S. Pat. 686,374 (11-12-01).
[36] U. S. Pat. 1,365,715 (1-18-21), assigned to the Cornell Wood Pro. Co.
[37] Bancroft, Chem. Met. Eng. 23, 454-6 (1920).
[38] Jespersen, U. S. Pat. 1,424,411 (8-1-22).

Barking Wood for the Manufacture of Pulp

FR. GREWIN and G. SODERLUND

(Translated from *Le Papier* xxvi, 1065-1073, September 1923, by A. Papineau-Couture.)

THE problem of barking is an important one and a difficult one. It has frequently been investigated with various measures of success, and most operators have come to regard it as a necessary evil in the manufacture of pulp. If we stop to consider, that the material going through the barkers is the most important and most expensive raw material used in the manufacture of paper pulp, it will be readily grasped that very appreciable savings can be effected by improving the barking equipment or process. The main points to be considered in an investigation into barking are:

1—Loss of good wood; 2—Cost of labor; 3—Effect of barking methods on the quality of the pulp and paper; 4—Minimum quality required of the pulp. We shall now consider each of these points in turn.

Barking Losses

The losses of wood which occur prior to delivery at the mill may at times be considerable, and their study would be both interesting and profitable; but unfortunately this does not fall within the scope of this article and would lead us too far.

We shall deal only with the losses incurred as a direct result of barking; and in order to remove any chance of a misunderstanding we shall begin by defining exactly what we mean thereby.

A statement to the effect that the loss on barking is 8 per cent or 20 per cent of the amount of wood sent through the barkers is quite meaningless, unless the nature of the loss is specified, that is, whether it includes the bark proper or refers only to good wood removed along with the wood.

It is absolutely illogical to consider bark as a loss, for it cannot be used in the manufacture of pulp and must be removed. The true loss is the wood which is taken off along with the bark.

The percentage of bark varies considerably with different woods and also with the same wood in different places; for instance, Professor Jonsson has shown that the bark of balsam fir from Northern Sweden represents about 14 to 15 per cent, by volume of the unbarked wood, while it becomes 13, 11 and 9 per cent with fir from Central and Southern Sweden. By the time the wood reaches the mill the variations in the amount of bark are much greater, owing to differences in the methods of transportation. River wood, for instance, sometimes remains in the water so long that it is nearly or completely barked when it is delivered at the mill; while rail wood has generally retained all its bark.

Owing to these great variations, if the bark is counted in the loss, it is imperative to specify the condition of the wood prior to barking. This method has been adopted by the authors on account of the difficulty of determining with any degree of accuracy, the proportions of bark and of good wood in the waste from the barkers.

The losses can be expressed either in steres or in cubic meters of wood. And as variations in the moisture content of the wood affect the weight and volume of the bark much more than those of the wood proper, it should be stated whether the results refer to dry wood or to wet wood.

It is thus seen that when speaking of barking losses the following indications should be given: 1—Origin of the wood; 2—Treatment in the woods, i. e., complete or partial barking, or no barking at all; 3—Method of transportation of the wood (water or rail); 4—Wetness of the wood when barked.

Methods of Barking

The oldest method of barking consisted in removing the bark by hand by means of a knife or a hatchet. A fairly clean wood could be obtained with a small loss of good wood, provided the men took an interest in their work; for if they did not the results were but indifferent at best. With the large mills which are to be found everywhere nowadays and the necessity of cutting down labor costs to a minimum, this method has been entirely superseded by machine barking, either with knife barkers or with barking drums.

Knife Barkers

The simplest form of knife barker consists essentially of a flat disc carrying knives, which rapidly rotates while the log is pressed against it. Such a machine is suitable only for short wood and has a low output. The amount of loss and the cleanliness of the wood depend on the barker man; but there is generally considerable waste, as it is difficult to turn the log uniformly during barking, and it is necessary to bark it until it has become practically cylindrical, irrespective of whether it was straight or curved to start with. This type of barker was subsequently improved by providing means for turning the log automatically; but most of the disadvantages of the machine remained.

It was the starting point of most of the modern barkers designed for handling wood of any length, and more particularly of the Robert and Libert barker, from which the Green Bay barker was evolved, and also the following barkers of Swedish make: Vaern, Fresk, Sandberg, and the latest type of Karlstad barker.

The Robert and Libert machine (as well as the Green Bay, Vaern and Fresk, which were evolved from it) has a slightly convex disc. The Karlstad barker has a conical disc, which presents certain advantages.

In the Fresk barker the rotation of the log is obtained by the combined action of a spiked roller and of the knives; whereas in the Karlstad barker it is driven only by a large and powerful roller, which is an advantage when handling logs of large diameter or straight logs, but which has certain drawbacks with small or crooked wood.

The performance of these two types of barkers was compared by very complete tests run at Hallska, in the spring of 1922, at the mill of Holmens Bruks och Fabriks A. B.

(The results of the tests are given in detail in two long tables, which lack of space prevents us from reproducing.—Trans.)

Analysis of the results obtained show that the shrinkage on barking can vary within wide limits, especially on account of the variable amount of bark still adhering to the wood when it reaches the mill. A few of the samples were hand-barked, and the results obtained tallied with previous data on the proportion of bark of the woods from the respective regions.

It can be assumed that on the average, wood reaches the mill with about half of the bark which originally covered it—that is, it still has about 6 to 7 per cent.

The average loss on barking with these machines should not exceed 10 to 12 per cent, so that the actual loss of good wood should not be greater than 4 to 6 per cent. This result was confirmed by tests carried out with completely stripped wood, in which, under the most favorable conditions, the loss dropped to below 3 per cent.

Unfortunately, it is not possible to make an absolute comparison between the two machines as re-

gards waste, since the same wood could not be barked on both. Luck was somewhat in favor of the Karlstad barker, which handled wood of a somewhat larger average diameter than the Fresk barker.

The following general conclusions can be drawn from these experiments, as well as from previous tests carried out under less favorable conditions:

The Karlstad barker does not work quite as well when handling small, crooked, hard and dry wood, as when fed with fairly large relatively straight, and (especially) wet wood. Under the latter conditions it works well, causes but little waste, and has a large output. The operator does not control the loss to any great extent, for if the knives are advanced too far they cannot bark. When this occurs the feed roller cannot turn the log, which is pushed right through the machine by the knives without being barked. Finally, the machine is quite easy to operate, and the feed roller can be handled without any great effort on the part of the barker man.

Results with the Fresk barker were not affected to the same extent by variations in the quality of the wood, and it worked as satisfactorily with dry, relatively crooked and small logs, as with large wet wood. The loss can be kept down, but depends largely on the skill of the barker man, who can advance the knives without any risk of cutting down the output of the machine, which is consequently very regular. By means of certain modifications which were subsequently made to this machine, a much greater output was obtained. It is more difficult to operate than the Karlstad barker; but this drawback can be overcome to a considerable extent with well trained men.

Barking Drums

This type of apparatus is not much used in Sweden, but it is used quite extensively in America. They consist essentially of hollow rotating iron cylinders, in which the logs are placed, and the bark is removed by the rubbing of the logs against one another and against the drum. The size and method of construction vary considerably with different builders.

A small type is sometimes used, which consists of a drum closed at both ends, resting on rollers on which it rotates. There is an opening at one end, through which the logs are placed in the drum. The inside surface is quite smooth, and does not injure the wood. But the output from the apparatus is low, so that a large number of drums are required, and also numerous help.

The most generally used models are open at both ends and work continuously. They are built up of variously shaped bars, such as M-irons, channel irons, etc. The smaller drums are built in one piece, but the larger ones are frequently built in several sections.

Two methods of driving are in vogue: the drum rests on rollers which are suitably driven by gears, or else it is suspended by means of endless chains which turn it.

The size of these drums varies considerably, and can go from 1.5 meters in diameter and 4 meters long to 2 to 3 meters in diameter and 15 to 18 meters long.

The chief advantages of barking drums are large output, low labor costs, and low waste of good wood.

Wet river wood is the most suitable for drum barkers, in spite of the fact that it is softer and more easily injured than dry wood.

Results obtained in a few American and Canadian mills show that the loss on barking varies between 0.5 and 2 per cent, according to the quality of the wood and the construction of the drum. Smooth drums give better results, but their low output militates greatly against their adoption.

Barking drums do not work at all well with dry wood, so that a large percentage of the wood must be put through the drums several times, or else be sent to the knife barkers. In one Canadian mill the use of relatively dry wood made the output per drum per day fall to about 25 per cent of its normal value.

Even when feeding wet wood to the drums, it is very seldom that it comes out sufficiently clean for use, and some of the wood must be rebarked with knife barkers. The Green Bay barker is generally used in America, and it handles about 15 to 30 per cent of the wood from the drums. At Hallska the barking equipment consisted of two drums which handled 700 cubic meters a day, and of four Hansson knife barkers, each of which had a capacity of about 5 cubic meters an hour, and which worked 20 hours a day. So that over 50 per cent of the drum-barked wood had to be rebarked. In a modern and efficient American mill two 10 by 60 drums handled about 2,400 cubic meters a day, and the insufficiently barked wood went to three knife barkers which had a capacity of about 500 to 600 cubic meters a day, so that about 20 to 25 per cent of the wood was rebarked in this case.

As the waste with knife barkers is rather high, the combination of drum and knife barkers causes an appreciably greater loss than the 0.5 to 2 per cent, which was found for the drums alone.

Of course in the manufacture of pulp for coarse papers, where purity and cleanliness are not of paramount importance, and wood can be used even when there still remain small particles of bark, the problem is quite different.

Another problem in connection with the use of the drums is the disposal of the wet bark. At Hallska, in spite of much experimenting and numerous tests with presses and various methods of drying, most of the bark removed during the last eight years still lies on the ground near the mill, where it forms a very respectable sized heap.

The results obtained in America were not much

better. Sometimes the bark was heaped up and aired by blowing it up with dynamite; and in some mills as many as ten men were required for this work. Other mills compressed the bark by means of more or less efficient presses, and then burned it under boilers; but the efficiency was very low; while still other mills, which were favorably situated for the purpose, merely dumped the bark into the river, which was the cheapest way of disposing of it.

Experience at Hallska has shown that the upkeep of barking drums is quite expensive, and this observation has been confirmed in America.

Effect of Barking on the Quality of the Pulp

Tests lasting several months were carried out at Hallska during 1921, to compare the effects of drum and knife barking on grinding and on sulphite cooking.

In the groundwood tests the yield of refined pulp, the power consumption (for grinding, for screening, and for refining), and the total production were determined. Each test lasted one week. The results obtained were as follows:

	Drum-barked wood	Knife-barked wood	Increase with drum-barking
No. 1 pulp—tons	169	208.5	....
Refined pulp—tons	36.9	33.5	....
Refined pulp—per cent	18	13.8	4.2
Kw. hr. per ton for grinding	1,145	1,010	135
Kw. hr. per ton for screening	53	46	7
Kw. hr. per ton for refining	53	44	9

In the sulphite tests eleven cooks were made with drum-barked wood and twelve cooks with knife-barked wood, and the yield per cook and proportion of knots were determined, with the following results:

	Drum-barked wood—av. for 11 cooks	Knife-barked wood—av. for 12 cooks	Increase with drum-barking
No. 1 pulp—tons per digester	16.24	17.54	....
Knots—tons per digester	1.38	0.54	0.82
Percentage of knots	8.54	3.09	5.45

These results clearly show that knife-barking is preferable in the manufacture of both groundwood and sulphite.

The increased output per grinder is especially noticeable, and reaches 17 per cent of the total amount of pulp, both No. 1 and refined. The average load on the grinders was maintained practically constant during the two series of tests. Owing to the increased production, the power consumption per ton of pulp was reduced from 1,251 kilowatt hours to 1,100 kilowatt hours, and was thus 14 per cent lower with knife-barked than with drum-barked wood. The amount of pulp which had to be sent to the refiners also decreased considerably and fell from 18 to 13.8 per cent. Further, it should be noted that the differences found were undoubtedly smaller than the annual average, as, owing to the time of the year when the tests were conducted, the wood was very hard and frozen, and the ends of the drum-barked logs were not damaged as much as they usually are.

The disadvantages of drum barking are just as marked in the manufacture of sulphite as of groundwood. The percentage of knots was 8.5, as against only 3.1 with knife barking. This means that in the latter case there was a corresponding increase in yield of No. 1 pulp per digester, which averaged about 6 per cent.

Finally, an examination of the quality of the pulps again showed up the superiority of the knife barkers, which gave a purer and cleaner pulp by both processes.

Summing up these results, a comparison of the two methods of barking shows the following relative advantages and disadvantages:

1—Loss of Good Wood

This loss varies from 0.5 to 2 per cent with wood which goes through the drums; but the loss on rebarking must also be taken into account. Considering that about 20 per cent of the wood must be rebarked, and assuming that this is carried out efficiently with modern Swedish knife barkers, causing a loss of 6 per cent, the total barking loss will be from 1.7 to 3.2 per cent, giving an average of 2.5 per cent.

If carried out exclusively with knife barkers, the loss should be about 6 per cent—that is, 3.5 per cent greater than with the drums.

2—Labor

In this respect the advantage again lies with the drums. It is not possible to figure out exactly the difference between the two, owing to lack of data on the output of drums. One example is given, however, of a barking room with a daily capacity of approximately 1,300 cubic meters where the use of drums reduced the staff by about 20 men.

But here end the advantages of the drums.

3—Disposal of the Bark

The calorific value of the dry bark from the knives is very much greater than that of the wet bark from the drums; and this advantage can go a long way towards offsetting the superiority of the latter as regards labor.

4—Groundwood Production

The power consumption in the production of groundwood from drum-barked wood is about 14 per cent greater than when using knife-barked wood. This means that the output of a given mill is lower in the first case, or else that for equal production the use of drum barkers requires a greater capital outlay.

5—Sulphite Production

Drum-barked wood produces about 5 per cent more knots (on the weight of the pulp), so that here again the output of the mill is reduced and more

capital must be invested to obtain the same production.

6—Quality of the Pulp

Knife barkers give a much cleaner pulp than the drums, and the latter cannot be used when high-grade cellulose is required.

In comparing the relative merits of the two classes of equipment, it is seen that the lower waste produced by the drums is offset by the higher proportion of stock sent to the refiners; and the lower labor costs are compensated by the decrease in the calorific value of the bark, and the reduced output of both groundwood and sulphite.

Conclusion

In America, where drums are used to a large extent in conjunction with knife barkers for rebarking, the amount of stock sent to the refiners is smaller than in Sweden, being about 4 to 5 per cent; but this is due entirely to the differences in the screening of the pulp as carried out in the two countries. This proportion could certainly be reduced by knife-barking all the wood, and this improvement would be the more important because in America refined stock is used as second-grade material, and is even discarded entirely in certain cases.

The losses in sulphite manufacture in America are of the same order of magnitude as in Sweden.

It is very difficult to decide definitely in favor either of the American method or of the Swedish method; they are affected by local conditions, and each case must be studied individually to find out the most satisfactory procedure. It is important, however, that the barking problem should be considered in its relation to the whole mill, and not merely as a separate and independent unit.

Material Control

BY H. M. GRASSELT

WITH the growth of the paper industry, competition has become so keen that profit must be figured with extreme closeness in order to obtain a sufficient share of the trade, and the executive who is anxious to insure continuous operations will not allow leakage and waste to pass unnoticed. He will not only keep in touch with improvements and maintenance of full effectiveness of his equipment as well as with new machinery that is being developed along his line, market conditions and labor policies, but also direct his efforts toward other factors which have a bearing on operations, production and costs. Some of these factors may not seem to be of serious import to influence the balance sheet, but nevertheless affect the profits of a concern if disregarded.

Material control is one of the factors that should receive a wider recognition and earnest consideration, especially in small plans, for its potent correlation to economical plant management. A slight leakage or waste here and there, overstocking and tying up of funds uselessly in excess material, will appear ultimately as a good-sized item in the profit and loss account on the loss side.

Systematic material control stops leakage, pilfering and waste of materials, educates help to carefulness and economy, and is a means to always keep a well-adjusted supply of raw materials on hand. It is, further, a prerequisite to a good cost system.

Material control has three distinct subdivisions—viz., the control account in the financial books, the stores ledger (or perpetual inventory), and the periodical physical inventory. In the financial books, the incoming materials are debited to raw materials or "stores account" and credited to bills payable. The stores ledger is for entries of receipts of goods at the storeroom and every issue from it. Receipts and issues are covered respectively by the receiving report and the requisition on stores. Materials issued and put into production are debited to the goods in process account and credited to the raw materials account. The periodical physical inventory is the natural prerequisite to an accurate stores ledger and taken at definite intervals to ascertain the true status of liquid and other assets.

This short outline of material control merely illustrates the theoretical correlation of its principal factors. The first factor—the control account in the financial books—is a straight accounting procedure and exclusively office work. The other two factors—stores ledger and physical inventory—however, have a more direct bearing on the practical end of material control and the man in the mill. This article will be devoted to the mill end, and, therefore, will treat of the latter two items only.

The Stores Ledger

A stores ledger (perpetual inventory) is essential to effective material control and should be kept in every plant, regardless of size or importance, for it constitutes a means of learning the comparative economy of plant management by records. An accurate physical inventory must, of course, precede the installation of a stores ledger. Ledger cards, which are always preferable to a book, have to contain a notation as to maximum and minimum of stock desired, in order to eliminate the danger of overstocking and shortage. Methodical storage and application of lot numbers to raw materials and supplies effectively support material control and offer a

means of a system of keeping together lots and units and thus preserve their original costs for valuation in the periodical inventories. As stated before, stores records, which as a rule carry both quantities and values, are generally known as "perpetual inventory." To be effective and reliable, they must be "perpetual" in the true sense of this word. Keeping of the records should not alone be confined to making of entries of receipts and issues of materials, but it should be made a practice to always take a physical inventory whenever the stock of an individual commodity is at a minimum. Thus a perpetual verification of the book inventory may be secured at any time independently of the regular periodical physical inventory. Before ordering new materials, the records are to be verified by an actual count.

Economic conditions require precaution, and nobody buys large quantities now. A perpetual inventory is the best agency to prevent overstocking, and, on the other hand, enables to hold materials to a certain minimum without impairing continuous operations. Changing market conditions may mean a great financial loss in case of overstocking. Excess materials also deteriorate very easily and, perhaps, lose value with age. Insufficient supplies of materials affect working schedules, lead to shutdowns or disruptions of operations in one or the other department. Shut-downs and attendant inability to deliver on promises may result in loss of customers.

Stores records and a well-organized storage system eliminate waste of time and materials. To have the right place for every commodity and its location indicated in the individual stores records, does away with heedless chasing of materials and permits of a regulated flow of materials and supplies to production.

Material control makes employes careful so that they will not waste materials indifferently or leave excess supplies on floors and in corners exposed to damage and deterioration.

These are just a few advantages of material control. The writer does not advertise any elaborate and expensive system, but emphasizes that a concise method of material control, supported by individual stores records that are adapted to particular needs and conditions of a plant, constitutes, indeed, a real factor in mill economy and will procure commensurate results in every respect.

Very often perpetual inventories are pointed out as failures because at the end of a year or other periods the physical inventory does not agree with the book records. The cause may be found in having neglected what the word "perpetual" implies—namely, to check the records from time to time by actual count or weight of units when they are at minimum. To merely use the records in a perfunctory, mechanical way, month in and month out, for entries of receipts and issues, without occasional verification of the balances on hand, will inevitably lead to large discrepancies between book figures and the physical inventory at the end of a year or inventory period. Such a procedure defeats the purpose of the perpetual inventory and its usefulness, and renders the records valueless and not worth the expense of their upkeep.

Of course, even with the utmost care and regular vertification of the records, there will occur discrepancies. This may be due to the particular character of certain raw materials used in paper mills and to clerical errors. However, with the exercise of ordinary care and attention, these discrepances will remain within reasonable limits and in no way vitiate the value and advantages of the records.

Materials represent money and should be accorded no less careful handling. No manufacturer would allow his bookkeeper or cashier to use the cash book for six months or a year without verifying now and then the amount of cash in the safe. Why not treat materials and supplies with equal care?

The Physical Inventor

Taking of the annual physical inventory means in many plants a good deal of interruption of routine work or even cessation of manufacturing operations. Quite naturally, the duration of inventory work depends largely on the size of the plant and its conditions as well as the character of goods that are manufactured. Taking of inventories involves considerable expenses, especially if it necessitates the stopping of operations. Hence many schemes for elimination of physical inventories have been tried and found wanting. It is inconceivable that any system or perpetual inventory will do away with the physical count. The human element and its age-old tendency to "err," particularities of raw materials and process of manufacture are factors that require serious consideration.

Notwithstanding the failure to find a fool-proof method of replacing the physical inventory, and rely wholly on book records, the perpetual inventory has simplified and facilitated the work of taking actual count.

Like other operations and transactions, the annual inventory can be planned and prepared in advance. To make proper preparations means elimination of all apprehensive hurry-scurry and resultant guesswork and juggling.

First of all, an annual "clean-up day" should precede the inventory, on which previous records are scrutinized for valueless or depreciated materials and supplies. Items which have become of little or no value should be either revalued at their actual worth or thrown out entirely. Many plants contain a lot of stuff that is nothing but junk, yet carry it in the inventory at an imaginary price. So-called

"spare parts" and repair supplies are frequently entirely worthless and yet are inventoried year after year. There are often lots of paper on hand that are too poor for job lots and the trade, but are carried in the inventory at a price entirely out of proportion to the real value. These lots belong back into the beaters or into the paper raw stock inventory and priced here accordingly. Paper not up to standard is to be re-graded, given a special lot number and taken into the inventory as such at an appropriate price.

Having rid the mill of useless items and made the necessary adjustments for depreciated values, preparations for the taking of the physical inventory may be made. Mills with a perpetual inventory are in a position to make out in the office inventory cards or tags. These cards or tags are printed and made up for the entry of description, lot number and quantity on hand of an article; in short, they contain all information necessary for the identification of an item. All details pertaining thereto, except the quantity, are to be inserted in the office and the cards then given to the department foremen, who in turn stick or tie them to the individual materials and pieces and insert the quantities determined by actual count and weigh in the cards.

It is the best policy to entrust the foremen with the work of taking the inventory in their respective departments, as their familiarity with materials and quantities qualifies them to do the work right.

Repair parts, such as gears, pulleys, etc., are to be provided with a numbered tag, which shows a complete description of the item as well as dimensions and other details. Having this information will eliminate taking of measurements at inventory time and also greatly assist the boss millwright in finding the right piece without delay when an emergency arises.

Many mills do not care to have individual inventory records for each and every piece of machinery, spare part, gears and pulleys, and prefer to have them listed on a separate sheet. Whenever a piece is used, its tag is forwarded to the office and the respective number crossed off. Additions are simply entered into the list under the right caption. One copy of this list is given to the boss millwright, whom it will serve with a detailed description of materials he uses, and further enable him to verify the number of pieces on hand at inventory time by merely comparing the numbers in his list with the tags on the materials.

Materials in process (in drainers, beaters, stuff chests, etc.) represent large values and require close estimation as to quantities It will be somewhat difficult for a mill without a cost system to correctly price these materials according to the phase of process to date. A conservative determination of the cost of material and incurred cost of labor must be exercised in such case.

Paper should be inventoried in distinct classifications of grade, color, size, weight and condition, whether cased, sealed, trimmed, untrimmed or rough in rolls, and priced accordingly.

The inventory should be compiled on special inventory sheets, numbered consecutively, and ruled with columns for entries of unit prices and totals, material units and total quantities. Raw materials and paper should be compiled in sufficient subdivisions, according to grades and classes, and in such a manner that not more than one kind is listed on a page. Thus the inventory will represent a pleasing, concise statement, which facilitates the valuation and procurement of reliable statistics and figures for tax and other reports.

Differences between physical inventory and book records are to be adjusted and charged to manufacturing expenses.

In these days of taxes, pricing of inventories has to be done with extreme care. A perpetual inventory representing records of individual lots and their original prices renders valuation of inventories easy. However, the methods of inventory price adjustments are rather arbitrary and vary greatly. Generally, manufacturers attempt to adhere to the pricing method of "cost or market, whichever is lower."

Many manufacturers take monthly physical inventories, which means very much additional work all around, is expensive and unnecessary, if a system of material control is in effect. With records of material control, whose figures are verified from time to time, a semi-annual or annual physical inventory will prove thoroughly sufficient.*

Getting Rid of the Seasons

OF ALL the so-called "unsolvable" problems of business, perhaps the most expensive and the least necessary is the problem of seasonal production.

Few concerns make any effort to solve the problem. They accept it as unalterable, probably in the belief that the seasons are an act of God. If rich they pile up inventories for a short selling season by keeping the plant going the year round. If they can't finance that, they shut their plants down.

Yet every year a few more concerns succeed in doing away with seasons. A soap manufacturer found that it was the jobber who had the seasonal hallucination. When he went direct to the retailer he found that people wash with soap the year 'round. He now guarantees year 'round employment to his workers. Another business reduces prices in the off-season as an incentive to its retailers to buy then.

When more concerns cease hibernating during off seasons, their profits will be bigger and labor troubles fewer.—Bassett.

*Supporting articles on the subjects of storage and material control were published in the Paper Industry as follows: April, 1922, issue, "The Small Paper Mill's Finishing Room, etc." August, 1922, "The Stores Department."

Northern New York Superintendents Hold Meeting

THE Fall Meeting of the Northern New York Division of the American Pulp and Paper Mill Superintendents' Association was held at the Carthage Club and the Elmhurst Hotel, Carthage, N. Y., on Saturday, November 17th, 1923. An attendance of about 100 helped to make this one of the most successful meetings this Division has ever held. The occasion started at noon on Saturday, with a visit to the different paper and pulp mills in Carthage. This was followed by the formal opening of the meeting at 3:00 o'clock in the afternoon, with Chairman Homer Stafford, of Knowlton Bros., Inc., Watertown, N. Y., presiding. There were three addresses given during the afternoon session, each of which brought out considerable discussion.

The first paper read was on the subject of "Steam Turbines and Power Transmission, as Applied to Paper Mill Practice," by A. J. Darling, of the General Electric Co. In the discussion, Mr. Darling stated that it is the practice in some mills to store excess steam and use it at other times. The heat losses, he said, are negligible. The question was asked if superheated steam is being used for process water, and in the discussion, one particular experience showed that the use of supersteam in the digester up to 100 degrees, is very beneficial. It has done away with the excess moisture and allows a greater solution of acid to be used. Considerable variance of opinion, however, existed on this point. Mr. Darling's address is published on another page of this issue.

The next address on the program was on the subject of "Powdered Coal and Boiler Equipment to Go with Same," which was covered by F. W. Dean, of Wheelock, Dean & Bogue, Inc., Boston, Mass., and is published on another page of this issue. In the discussion which followed, Mr. Dean stated that it takes 20 H. P. per ton of coal to run the auxiliary equipment, or in other words, to pulverize 2,000 lbs. per hour, a 20 H.P. motor is required.

One Mill's Experience with Pulverized Coal

Mr. N. J. Argy, of the Cliff Paper Co., Niagara Falls, N. Y., gave an interesting account of his mill's experience with pulverized coal. He said in part as follows:

"I am not in position to give any real report in regard to burning pulverized coal. It is hardly fair to give any figures, as I have only been operating this furnace for three months. So far it has been very satisfactory. Last winter our plant was down. We had three boilers which were developing 450 H. P. and a Babcock and Wilcox boiler of 510 H. P. capacity and we wanted to put in stokers. I had occasion to go to a plant which was using pulverized coal, very similar to this one, built by the Erie City people, and they were working a very simple apparatus. It appears very much like the Jordan. They blew the coal through the furnace door. It looked very much like a blow torch. There was practically no ash in it and it had been running over a week. There was no grate. It is simply a brick oven right in front of the boiler. There was absolutely no smoke. The fireman had nothing to do but open the valves.

"I went out to Erie and saw their furnace in operation. We ordered two. To be on the safe side, we put in two pulverizers so in case there was an accident we would have another to slip in. Things are working out very satisfactorily. First of all, we take the coal from the grate. It is carried on a belt from there to the magnetic separator and any iron is taken from it. We have never had any iron go through our pulverizer as yet. We made a week's test on evaporation a week ago. We evaporated 9 5/10 lbs. of water to a pound of coal. The temperature of the feed water was an average of 165 degrees. That is not very high. We have a poor pump. When we get the temperature any higher we are not able to get the water at any higher temperature in the boiler. We got 78%. The boiler was only running at 85%. The furnace walls were hardly flat enough to get the very best results. There was no smoke coming out of our stacks. Another thing, as Mr. Dean said, there is no loss in lighting your fire. When you shut down, you simply close the valve.

"In regard to the ash, we made a test and found there was 13% of ash in the coal. Out of the cone chamber on a week's test, we got 2% of ash out of the back pit and we got 1½% out of the stack. There was a very large accumulation of ash in the stack. Our boilers are stationed in this way. The stack is on the front of the boiler and has about 45 feet to run from the back to the stack. This ash is in a very powdery form. We can blow it with our breath. We find every Sunday we have eight or ten inches of ash. Out of the stack we get about 1% in ash of the fuel consumed.

"One man has operated our furnace. We can push up our temperature at any time to 100 degrees in 45 minutes or less. When the coal got very wet, the steam pressure dropped down to 50 lbs. It is the most flexible thing I have ever seen. The first three weeks I ran the furnace, I did not know about any accumulation of ash in the stack, and the third Sunday when in the boiler room, I said to the fireman, 'I have an idea there must be an accumulation in the stack.' He stepped up and opened the door and in five minutes the boiler room was full of ash. It would take 24 hours to wheel it out in a wheel barrow, but in one hour it was all out. The fireman attached the hose and wet it down and it ran off into water and flowed down into the sewer. It would be easy to install sprinklers in the stack.

"There are many things we have got to learn and I hope at our next meeting I will have more data, which I will be glad to give you."

Mr. Dean was asked how fire varies in using poor and good coal; in other words, the difference between coal of low and high ash contents. He replied, that it does not seem to be affected, so far as he has discovered. "Coal with a good deal of ash," he said, "burns and you simply have more ash." Two carloads in Virginia, one had a lot of sulphur and one a lot of ash, went to Erie for analyzation. It showed the carload with a lot of ash 68 per cent, and yet it burned all right, but it nearly blocked up the pipe from the pulverizer to the boiler. There is coal near Pittsburgh from what is called the Bessemer mines, which has a large amount of sulphur. He said that this has burned with no difficulty. Coal with a high volatile is supposed to be a little better than a coal with a low volatile matter, yet coal with 18 per cent volatile matter burns all right. He said that Pocahontas coal of 17 per cent volatile matter, burns. Coal of high volatile matter tends to burn a little more promptly of course, and utilizes the furnace volume a little better. "The coal in Canada is mighty poor coal," Mr. Dean said, "but when pulverized it burns just as well as the best in the world."

"The Three Pocket Small Grinder as Against the Magazine Type in Grinding Wood," was the subject of the next paper, given by Mr. F. W. Roberts, of Lockport, N. Y. This paper will be found on another page of this issue. Considerable discussion followed the reading of this paper, with respect to comparative costs of operating the two kinds of grinders. Mr. Robert Argie, of the Cliff Paper Co., gave an interesting comparison of figures. He said in part as follows:

"We have a test on our three pocket grinder run over a period of 24 hours with a H. P. consumption of 50 per ton of pulp. This is a very good per cent compared with anything else I have heard. If you take into consideration the price of our grinder, which is about $5,000.00, against what I understand the magazine grinder costs, or $25,000.00, and the erection of a building, which would be about $100,000.00, your magazine grinders would cost $25,000.00 each. Your installation of electric equipment would cost $28,000.00. Against that you could put in two of our grinders. There is a difference of $150,000.00. Now the interest on your money is 10 per cent, and it would go a long ways for extra help. As I figure it out, the cost of the overhead would have to be taken into account in making any comparison between these two. There is the condition of the quality of the boiler and condition whether you have equipment of water power or electric power.

"The main thing is whether this extra expense of the magazine grinder is going to offset the old way of the three pocket grinder. It looks to me as though it is a question of whether you want to use 4 ft. wood or 2 ft. If you use 4 ft. wood there is a great saving. If you use 2 ft. wood you lose the difference. So far, I have been unable to get any data that would show that one grinder is any better than another."

Following the presentation of these papers, a discussion ensued, relative to the place in which to hold the next meeting of the Division. It was recommended that the meeting be held

in October next year, which will not be too near the time set for the National Convention, which will be held in Dayton, O., on May 2, 3 and 4, 1924. It was finally agreed and carried that the meeting be held at the discretion of the officers of the Division at Niagara Falls, N. Y., the time to be arranged by the Executive Committee.

The Banquet and Evening Session

A banquet was held at the Elmhurst Hotel in the evening, with Mr. John O'Connell acting as toastmaster. Dr. Hugh P. Baker, Secretary-Treasurer of the American Paper and Pulp Association, gave an excellent talk on "The Paper Industry and Conservation of Forests in the East." This was followed by a short talk on the subject of "Water Storage" by Mr. Charles Norris, an attorney of Carthage. Entertaining features followed in the shape of two very pleasing monologues in foreign dialect.

Those Present

Robt. G. Argy, Cliff Paper Co., Niagara Falls; Delbert Martin, Diana Paper Co., Harrisville; F. W. Mullen, W. C. Stebbins Co., Inc., Watertown; B. J. Flynn, Diana Paper Co., Harrisville; N. J. Argy, Cliff Paper Co., Niagara Falls; John Authen, Diana Paper Co., Harrisville; Joseph Bell, St. Regis Paper Co., Norfolk; E. G. Eggleston, Champion Paper Co., Carthage; H. P. Cadwell, North Country Coal & Supply Co.; E. G. Eddy North Country Coal & Supply Corp.; Milton J. Maguire, Empire Size & Chemical Corp.; H. E. Rockwood, Champion Paper Co. Carthage; J. R. Van Amber, North Country Coal & Supply Co.; Chas. H. Plantz, St. Regis Paper Co.; C. T. Wright, Champion Paper Co., Carthage; P. J. Baron, St. Regis Paper Co.; W. P. Forbes, Champion Paper Co., Carthage; E. W. Clarke, Knowlton Bros., Watertown; H. E. Harmon, Knowlton Bros., Watertown; George W. King, Delber Rubber & Supply Co., Syracuse; A. D. Merrill, Stebbins Eng. & Mfg. Co., Watertown; C. R. Outterson, Adirondack Mineral Co., Inc., Carthage; C. J. Schoof, Crane Co., Syracuse; C. A. Castles, Adirondack Mineral Co., Inc., Carthage; F. W. Roberts, F. W. Roberts Mfg. Co., Lockport; J. F. Gordon, Crane Co., Syracuse; Hiram Sanders, Carthage National Paper Products, Carthage; W. J. Hinds, Carthage Machine Co.; John D. Henderson, THE PAPER INDUSTRY; Pat Moran, Carthage Sulphite Pulp & Paper Co.; A. K. Hinds, Carthage Machine Co.; K. F. McGeary, St. Regis Co., Norfolk; Harold Oken, Watertown; B. H. Traduzee, Traduzee Supply Co., Watertown; Martin Nolan, Diana Paper Co., Harrisville; Seibert Lippitt, International Paper Co., N. Y. C.; C. A. Lura, St. Regis Co., Deferiet; S. W. Tripp, treasurer, Treadwell Supply Co., Inc.; H. Weston, American Meinger Co.; H. E. Newcomb, St. Regis Paper Co., Deferiet; Frank C. Baker, Belleville, N. J.; E. E. Martin, Bagley-Sewall Co., Watertown; Leonard Mann, National Aniline & Chemical Co., N. Y. C.; H. D. Frost, Cleveland; W. S. Tyler Co.; J. W. Rice; W. C. Stebbins, Watertown; T. H. Holness, Knowlton Bros., Watertown; Carl C. Schneider, Knowlton Bros., Watertown; K. N. Gradings, Crane Co., Syracuse; Stanley G. Linney, Ryther and Pringle Co., Carthage; A. R. Ackerman, Mgr. Crane Co., Syracuse; C. A. Denny, St. Regis Paper Co.; M. J. Connell, St. Regis Paper Co.; Robt. Eldredge, The Foundation Co., New York City; L. F. Urunger, St. Regis Paper Co.; J. E. Cuddleback, General Electric Co., Syracuse; J. J. Grieb, Ryther & Pringle, Carthage; R. S. Martin, St. Regis Paper Co., Herrings; A. V. Miller, St. Regis Paper Co., Deferiet; Allen Fritz, Ryther & Pringle, Carthage; E. S. Baker, Lowe Paper Co.; C. R. Gibbs, Ryther & Pringle Co., Carthage; Earl F. Trawnor, West End Paper Co., Carthage; John C. Murray, Carthage; E. L. Outterson, Ryther & Pringle Co., Carthage; Fred Norwood, St. Regis Paper Co., Black River; Luke E. Burns, St. Regis Paper Co.; C. D. Dawley, National Paper Products Co., Carthage; H. E. Staf-

WINTER RULES

NO!! NOW LISTEN HERE YOU NUT! I HAVE TO HAVE THIS ARGYMENT WITH YOU EVERY DARN YEAR AND THEY HAIN'T NO USE COAXIN' THIS YEAR! NOW I'VE BEEN PURTY DECENT TO YOU SO FAR--BUT YOU DON'T SEEM TO 'PRECIATE IT—ALWAYS WANTIN' TO ARGY!! GO HUM TO THE LITTLE WIFE AND KIDDIES -- DO YOUR CHRISTMAS SHOPPIN' AND GIT READY TO PLAY SANTY CLAUS -- YOU'VE HAD THIS LINNIX ALL SPRING, SUMMER 'N FALL -- NOW IT'S MY INNIN' GET ME? I'M GOIN' TO TURN ON THE DIRTY WORK AND IT AIN'T GOIN' TO LOOK LIKE THE SAME OL' PLACE KID -- NOW BEAT IT FOR HUM! GWAN!
OLD MISTER WINTERS
AH-H-H JUST ONE MORE ROUND CHIEF!
NO 1 330 YDS.
SNOW SLEET AND ICE
BRIGGS
-WYKAGYL-

—*Chicago Daily Tribune.*

ford, Knowlton Bros., Watertown; N. Rigabar, National Paper Products, Carthage; J. L. Strickland, Hdw. & Mill Supplies, Carthage; J. H. O'Connell, Diana Paper Co., Harrisville; Rev. Hollis D. Burns, Black River; William Bridges, Defiance Paper Co., Niagara Falls; C. C. Church, Eng. National Paper Products, Carthage; Hugh P. Baker, American Paper & Pulp Assoc.; M. C. Drutalspiel, National Paper Products, Carthage; J. L. O'Connor, Ogdensburg; E. B. Eddy, National Paper Products, Carthage; L. D. Post, The Paper Mill: W. B. Rapley, Diana Paper Co., Harrisville; J. A. Batley, Island Paper Co., Carthage; George N. King, St. Regis Paper Co.

Semi-Annual Convention of Cost Association

The Cost Association of the Paper Industry held its semi-annual convention at the Sylvania Hotel, Philadelphia, on Thursday, Friday and Saturday, November 22, 23 and 24. Although there was not a record attendance as far as numbers are concerned, the meeting was voted a great success, in that many valuable papers were presented. The convention was attended by about sixty members from the paper centers in the United States.

The convention opened Thursday morning with an address by President Jasperson, entitled "The Cost Association and Its Work." This was an excellent address, telling the relation that the Cost Association has to industry in general and what its real work is and should be. One other address was given in the morning session. This was "The Relations of the Cost Record to the Commercial Books," by Dr. Edward P. Moxey, Jr., of the Wharton School of Finance and Commerce, University of Pennsylvania, Philadelphia. Several charts were employed in his address, which created considerable interest.

In the afternoon session, Mr. Alexander Wall, secretary of the Robert Morris Associates, of Lansdowne, Pa., spoke on "The Value of a Typical Statement." James O. McKinsey, of Frazer and Torpet, Chicago, concluded the afternoon session with his paper on "Why Paper and Pulp Mills Should Keep Budgets."

The Association banquet was held in the evening. Between the courses, entertainment was furnished by professional entertainers, which contributed to the enjoyment of the feast. Among the speakers of the evening were President Henry W. Stokes, of the American Paper & Pulp Association; Col. B. A. Franklin, of the Strathmore Paper Co., on "The Paper Industry and Its Cost Problems from an Executive's Viewpoint"; Dr. Hugh P. Baker, executive secretary of the American Paper and Pulp Association; and Joseph T. Lang, of New York City, who delivered an excellent address on "How to Sell Yourself Successfully."

Election of Officers

The business meeting was held Friday morning. The official report of the Association was presented by the secretary-treasurer, Thomas J. Burke. The following officers were elected:

President—James A. Reilly, of the American Writing Paper Company.

First Vice-President—C. A. Jasperson, of the Nekoosa-Edwards Paper Co.

Second Vice-President—E. J. Fitzgerald, of the Scott Paper Company.

Third Vice-President—W. S. Bromley, of the Hammermill Paper Company.

Fourth Vice-President—J. E. Hyde, of the S. D. Warren Company.

Executive Committee—James A. Reilly, C. A. Jasperson, Col. B. A. Franklin, Seth L. Bush, W. G. Bromley, and Dr. Hugh P. Baker and Thomas J. Burke, ex officio members.

An address was then delivered by Mr. J. Austin Smith, of the J. Austin Smith & Co., on "The Special Relief Sections of the Federal Tax Acts." Mr. J. Linton Engle, former president of the United Typothetae of Philadelphia, read a paper entitled "United Typothetae vs. Federal Trade Commission." This paper was the result of an invitation given to Mr. Engle by the Cost Association, to explain clearly the statement made in a recent circular letter, widely distributed by their organization, to the effect that the recent order issued by the Federal Trade Commission to them condemned a practice that is vital not only to the United Typothetae of America, but to every other trade association in the country, because "it forbids members to give and the United Typothetae to receive production cost figures, with a view of computing and publishing composite cost statements therefrom."

The United Typothetae's letter goes on to say: "Inasmuch as this strikes at the vitals of the cost accounting educational work carried on by ourselves and many other trade associations, and would rob such educational activities of a large part of their value, the Typothetae feels it is not warranted in complying with this paragraph of the order until the court of last resort so rules, if it ever will. No court has thus far so declared and even the Commission had to break new ground to make this order. Accordingly, all trade associations carrying on cost work can well afford to await a court decision on this clear-cut issue, before reversing their policies of cost finding.

"The attitude of the Commission evidently is that the interchange of production cost statistics between competitors and members of a trade association is in the same class as the interchange of selling prices, recently declared to be unlawful by the Supreme Court of the United States, in the Hardwood, Lumber and Linseed Oil cases. Even a most superficial consideration shows them to be totally dissimilar, and our case is a capital one, to test the legal decision."

The afternoon speakers were G. W. MacNaughton, secretary-treasurer of the Technical Association of the Pulp and Paper Industry, who gave an address on "Steam Power Costs"; C. H. Scovell, of the Scovell, Wellington & Co., who talked on "The Logical Structure of a Cost System"; and S. F. Fannon, who gave an address entitled "The Seventy-five Cent Dollar in Business."

Saturday, the last day of the convention, was taken up by a visit through the Dill and Collins plant of Philadelphia. This visit was arranged through the kindness of Mr. Grellett Collins, president of that company.

Vapor Absorption as Applied to Box Board Machines *

By J. L. WILLIAMSON
Western Representative, J. O. Ross Engineering Co.

THIS subject is about as old as paper making itself, for since the first paper machines were installed it has been necessary to carry away the moisture from the sheet through the agency of common, everyday air, because air is the natural vehicle for this purpose. Contrary to current opinion, it is a fact that all drying of paper on the conventional type of paper machines is by means of air, since the temperature of the sheet is usually below 212 degrees, which means that the water is not being boiled from it, but that it is simply being absorbed by the surrounding air. In other words, under the present form of manufacturing, we could not dry a pound of paper if we did not have a constant supply of air moving away from the dryers. When the water leaves the sheet, it is in a gaseous form termed water vapor, and when this water vapor is mixed with the air surrounding the dryers, this is commonly known as vapor, which really means a fog or condition of saturated or partially saturated air. Vapor absorption then is simply the mixing of hot air and water vapor, which process is a most simple one indeed, since both of these substances have a natural affinity and if placed in close proximity they cannot help but mix.

The paper and board machines first installed were narrow machines, probably not over 36" in width. Therefore, the problem of mixing the air and vapor, or as we call it—vapor absorption—was not of great consequence. As the development of the craft has proceeded, however, machines have become wider, tonnage is higher, and a great deal more is expected of the machine than was thought possible a few years back, and vapor absorption or the carrying away of the moisture from the sheet, is only one of the many problems which the board mill superintendent has to solve. The term "Vapor Absorption" has lately been used as a trade name for systems of forced air circulation around the dryers, which undertake to do this job by mechanical means instead of by the natural flow of air. This idea of forced circulation of air around the dryer is not by any means new. Examine the patent records, or talk with any of the old time paper mill superintendents and they all can tell you of devices that were installed in the past for this purpose. Some of these really consisted of adjusting windows in a certain manner to deflect the breeze from outdoors and blow them directly toward the paper machine. Other devices consisted of mechanical means for blowing the air at or around the dryers, and all of these systems were more or less successful, depending on the amount of direct contact which the forced circulation had with the face of the dryers, or rather the sheet of board surrounding the face of the dryers.

*Address before the joint meeting of the Board Division and Michigan Division of the Superintendents' Association, at Kalamazoo, Mich., November 15, 1923.

In a recent conversation with an old, down East, high grade writing paper superintendent, this gentleman told me of a plant years ago where he increased the drying capacity tremendously by simply installing a row of common desk fans, mounted on pedestals high enough to blow a draft of air directly against the outside face of the dryers; the idea being to circulate the air across the machine.

Other schemes, known as cross ventilation, have also been installed successfully. Such systems usually contemplate hooding the machine in such a manner that the air is exhausted from the rear, and therefore fresh air from the room itself is pulled between the dryers. This movement of air lengthwise of the dryers carries the vapor away, and the circulation certainly does tend to increase the production. This method is particularly applicable to high speed machines making thin papers, where there are top and bottom felts which prevent the application of air direct against the sheet itself, which is done by more refined methods, outlined below. Along with the systems for cross ventilation there are also various systems for blowing air into the frame of the dryers by means of small ducts. These systems also appear to have their field more with the high speed Fourdrinier machines than with the slower speed board machines, although systems of this type have been installed in some instances on board machines, where the clearances between the dryers was too small to allow for the introduction of the cross nozzle pipes.

Conception of Present System

The vapor absorption system as it is now known, was first conceived by a board mill superintendent named Belcher and was first applied at his mill, the Chicago Coated Board Co., where it has been in operation since 1912, and I might add that there are upwards of 250 systems of this type now in operation in boxboard, pulp, roofing and other heavy paper. Mr. Belcher's idea was to arrange nozzle pipes in the vapor pockets and provide these pipes with openings that would introduce a blast of warm air against the sheet. In other words, instead of introducing air at the end of the pockets and allowing it to flow lengthwise of the dryers through the machine, Mr. Belcher's idea was to introduce the air at right angles to the sheet and then allow it to work out of the ends of the pockets, carrying away the vapor at the same time. This method has been improved from time to time, especially in the arrangement and design of nozzles for promoting the highest possible air blast, and at the same time making an even distribution across the sheet in such a manner as not to cause any appreciable draft from either the front or rear sides, and above all not to overdry the edges of the sheet. The advantages of such a system are, of course, obvious. In fact I feel that every board mill superintendent has operated these systems during some time in the past ten years, therefore, it is hardly necessary to give any detailed description of the system itself, and I will confine my remarks more to the application than to the mechanical design.

One of the most difficult questions in regard to this system is that of economy in operation. It is indeed very hard to get an exact check on the amount of steam used on such a system. Some of the tests have shown less steam used per pound of board made; some have shown that the system uses a trifle more steam per pound of board dried, but it seems to be next to impossible to secure a really accurate test because of the many variables involved. The theory of the whole proposition is this: we must carry away so much moisture from the sheet if we are going to turn out so many pounds of board. The only way we can carry off the moisture is to mix it with air, or else it will precipitate or condense inside of the building. Roughly, it takes 1,000 cu. ft. of air per minute for every ton of paper or board made per day. This air must be heated from outdoor temperature to the temperature at which it leaves the ventilators. Even if the air is taken from the inside of the building in a partially warmed state, it must eventually be replaced with cold air from the outside, and there is no getting around it that the air must be heated to a certain temperature or else it won't carry off vapor. If the air is not heated in blower coils and blown directly on the dryers it must be heated by passing over the face of the dryers themselves, or else by passing over direct radiation coils, or heated in some other part of the building by some heat-producing medium. It is, therefore, evident that if we heat our air to a certain temperature, say 130 deg., and blow it directly against the dryers themselves, we are not going to use any more steam than if we simply allowed the air to circulate by gravity through the room, and become warmed over the surfaces of the dryers to a degree high enough to carry away the moisture.

Another feature that is well worth considering is the theory of why forced circulation promotes extra drying, or, if we put it that way, increases the capacity of the dryers for doing extra work. To use a homely and time-worn example, our clothes on wash day in the back yard will dry very nicely even on a cold, damp day if there is a breeze of air blowing against them and whipping them around. On the other hand if there is no breeze the clothes do not dry as quickly. Now the reason for this is that the breeze or circulation of air breaks up the moisture envelope which surrounds the clothes, or the paper, and when this takes place, the moisture is given up more readily. Chemists will tell you that instead of breaking up the moisture envelope, what we really do is to release the vapor tension of the air surrounding the sheet and thus make it possible for the two elements, water and air, to unite more readily. I don't think there is any argument but that the forcing of air over any drum or steam-heated receptacle tends to increase the amount of radiation, and this may be proven by taking a common desk fan and blowing it against a steam radiator. You will find by doing this that the B. T. U. given off will increase from 50 to 200 per cent.

What the System Accomplishes

Now, the natural question is—what does this vapor absorption system accomplish?

First, of all, it increases the radiating capacity of the dryers, and by supplying the necessary air to the proper places, carries away the vapor at the same rate that it is evaporated from the sheet. In other words, unless acted upon by mechanical means, or by means of a strong, natural draft, the vapor has a tendency to hug against the dryers, and if the air surrounding the dryers is saturated with vapor, it is apparent that the dryers can do very little work. Therefore, we actually do get an increase in drying capacity.

Second—By supplying air directly against the middle portion of the sheet as it comes over the dryers, the system tends toward an evenly dried sheet across the entire width of the machine. I think that I am correct in saying that the bane of the modern wide board machine is the high crowns necessary for use on the press rolls. This is done in order to squeeze more water from the center of the sheet, because the center of the sheet has a tendency to dry slower than the parts of the sheet nearer the edge of the dryers. When the air is supplied to the central portion of the sheet it is found possible to dry at almost the same rate as the parts of the sheet nearer the ends of the dryers. Therefore, press roll crowns may be reduced anywhere from 33⅓ to 50 per cent, and in some cases even greater than that.

Third—Quality is also a consideration in every mill, and we all know that quality is chiefly obtained by keeping the surface of the dryers as cool as possible in order not to destroy the fibre. We know of certain papers that are made without the use of steam at all, simply a circulation of warm water in the dryers. This of course applies to the very highest grade of papers; the particular machine I have in mind makes rag paper for photographic uses. It is impossible to use such a low temperature on a board machine, but instead of using 30 lbs. steam pressure, as is often necessary where a machine hasn't sufficient dryer capacity, if the proper vapor absorption system is used the same tonnage may be turned out at from ½ to ⅓ the normal steam pressure. Unfortunately when these systems are installed, a great many of our friends prefer to increase production rather than reduce the steam pressure and improve the quality. Of course I have no criticism to make since it is primarily their job to secure production, but I think the time is coming when all board machines will have more ample dryer surface and can thus operate with low steam temperature and still maintain a high rate of production.

Fourth—I will now touch upon the subject of ventilation, which is more or less intimately linked with the subject of vapor absorption. Before forced circulation of air was used on the dryers, most of the larger mills found it necessary to introduce warm air, usually underneath the hoods in order to prevent condensation from forming. In large mills it is still necessary to do this, although the amount of air required to keep the roof from dripping is greatly reduced if vapor absorption system is used. In other words, if it takes 60,000 cu. ft. per minute to carry away the vapor from a certain machine, I would recommend supplying the major portion of this air through vapor absorption nozzles, and the minor portion to be distributed underneath the hood, particularly at the wet end of the machine room in order to prevent sweat and drip from forming there. The amount of air necessary for ventilation may, however, be greatly reduced if the machines are provided with a proper form of hood, because it is obvious that if the vapor is carried off directly and not allowed to distribute into other portions of the room, there will not be the need for additional heat to bring the surfaces of the

roof and side walls to a point high enough to prevent the vapor from forming on them by condensation.

There have recently been perfected devices for pre-heating the air used for ventilation or vapor absorption, by means of a heat interchanger, or economizer, located in the path of the vapors leaving the hood; the theory being to heat the incoming air on hot plates which are kept warm by the condensation of the vapor within. These systems have been installed largely in Canada on large newsprint machines, but there is no reason why they should not be used to advantage in connection with box board machines, provided that the ventilation and vapor absorption system are properly designed for use in connection with this economizer.

The Three-Pocket Small Grinder as Against the Magazine Type*

By F. W. ROBERTS, Lockport, New York

IN SO FAR as wood handling costs to the grinder are concerned and taking the average pocket grinder installation, the evidence is undoubtedly in favor of the magazine grinder.

For instance, Mr. Hunt, ground wood superintendent of the Soo Mill of the Spanish River Paper Co., informs me that at their Fort William Mill with six magazine grinders and grinding an average of one hundred cords per day, they have but two grinder men and two men on the charging floor.

This means that two men place in the grinder magazines 33 cords of wood on each shift or 16½ cords per man. With the two grinder men who look after the operation of the grinders this would figure about 8 cords per 8 hour day per man.

With the ordinary pocket grinder installation which would be one man to two grinders using 400 H. P. and grinding, say seven tons per grinder in 24 hours, we would have approximately 14 cords of wood ground. This would mean that a man handled on each 8 hour shift only a little over four cords.

It is undoubtedly true, also, in the average mill equipped with pocket grinders, that it costs more to get the wood to the grinders than in the modern magazine installation, in as much as the wood is handled on trucks or some similar method more expensive than up to date conveying systems.

The 32" Grinder with 750 H. P. Val Jalbert Mill

I have made this comparison so far with special reference to three pocket grinders using 24" wood.

When we consider late installations with grinders using 32" wood and utilizing 700 to 750 H. P. per grinder, we get quite a different result.

With this sort of equipment, one man will still operate two grinders using 1400 to 1500 H. P., as it requires very little more effort to handle 32" wood than it does 24".

With a production of twelve tons per grinder, this makes nearly 24 cords of wood ground on two machines with 1400 to 1500 H. P., one man handling eight cords of wood per day, which is practically identical with the Voith type of magazine grinder. We also begin to get here with this type of installation, a better production per horse power.

With reference to the above conditions, I would say that these are the actual conditions existing today in the Val Jalbert Mill of the Chicoutimi Pulp Co., at Val Jalbert, Quebec. They have ten three-pocket grinders using 32" wood 700 H. P. per stone and make an average of 120 tons per day or 12 tons per grinder. This would be 58 H. P. per ton of pulp.

Very similar conditions exist at the Abitibi Paper Company plant, where they claim to beat all records of the magazine grinders, but I am not now in possession of the actual figures.

The comparison of the two methods of grinding is not by any means settled by a comparison of wood handling costs. When we come to cost of pulp stones per ton of pulp, we find that the figures are much in favor of the pocket grinder.

The agents for one of our best known pulp stones gave me these figures in Montreal a few days ago. They are 45c per ton for pocket grinders and 80c per ton for the magazine.

This is due to the very high cost of the large stones for magazine grinders and a higher percentage of breakage, owing to the more severe operating conditions. For instance, in the new caterpillar type of Voith grinder, now being installed by Kenogami, they broke three stones from June to September.

I am informed that one of our local concerns, after making careful investigation of all the conditions, have practically determined to install pocket grinders in their new plant in preference to the magazine grinders. Undoubtedly, the predicted scarcity of magazine stones and their high cost had considerable influence in this decision.

Personally, I do not look for a serious scarcity of this size of pulp stones, as our present quarries are capable of greater development and some of the Canadian quarries, like the Miramichi for instance, are capable of a much increased production.

So far as production of pulp per H. P. is concerned, I know of many instances where the pocket grinder excelled the magazine grinder in production per H. P.

Pocket Grinders Use Less H. P.

It would not perhaps be advisable to mention the production per H. P. of various mills, but I know of one large installation where they were down to 12 and 14 tons per grinder with 1400 H. P. on a stone. I know of another where 16 tons with 1200 H. P. was their production, and another mill which has made 20 tons per grinder with 1400 H. P. on a stone. You will see that with these very expensive installations that they have not resulted in any reduction in the amount of power used for grinding wood pulp. I can, on the other hand, point to a considerable number of pocket grinder installations using less than 60 H. P. per ton for grinding. I know of two mills that are using less than 50 H. P. per ton and several more that are using less than 60 H. P. per ton.

There is a point here in connection with production per H. P. which is not given the consideration it deserves by the average mill man.

By conversation with a member of the firm which builds magazine grinders in Canada, he told me that he did not consider the production per horse-power an important factor at all, and he quoted prominent officials of one of the largest companies of Canada as saying that it was of very small importance. Here is how important it is.

One magazine grinder operating with 1400 H. P. and using 70 H. P. to the stone will make twenty tons of pulp a day or 6000 tons per year. The power bill for this grinder at $25.00 per H. P. will be $35,000.

The best installation of pocket grinders would be two units using 700 H. P. and would produce at 50 H. P. to a ton, 28 tons per day or 8400 tons per year at the same expenditure for power. This is a difference in favor of pocket grinders of about $1.55 per ton.

It does not appear to be possible to get these high productions per H. P. on magazine grinders for a number of reasons. From my own view point, I consider the peripheral speed of the stone too high and believe that better results would be obtained if the motors were designed to run 300 R. P. M., instead of the 240 to 250 R. P. M., which most of them use. It is much easier to maintain a suitable dress on the stone when run at a slower speed.

With reference to peripheral speed of the stone, Thickens found in the tests he made at Madison, Wis., that it had only a very slight influence either on quality or production. As it has a very considerable influence on the life of the stone, I am very much in favor of slower speeds.

There is in a number of mills, serious trouble with the wood's binding and arching in the magazine. This results in very bad pressure conditions, as the grinding pockets are at these times compelled to carry very high pressures until this condition is relieved and all pockets are working.

I have noticed lately, particularly in some mills where the wood varies considerably in size, that there is a very bad tendency for the wood to drop endwise into the pocket. Knotty wood or logs larger on one end than on the other will do this, resulting in the very worst grinding conditions, wood in this position on the stone will slow up the whole production of the grinder until it is ground out. I understand that where the wood is small and uniform in size and well barked that there is comparatively little of this trouble. Mills using northern Ontario wood experience less trouble from this source than mills using wood from various parts of Quebec.

My conclusions are then, that with an up-to-date pocket grinder installation, you will get better quality of pulp, a much larger production per H. P. and with properly designed wood handling system, operating costs at least as low as magazine grinder installations.

The investment where the grinders are directly connected to water wheels probably would not be over one-half that of the magazine grinder.

*Presented at the Fall Meeting of the New York Division of Superintendents, Carthage, N. Y., November 17, 1923.

The Publicity Paper Corporation, of New York City, has increased its capital stock from $30,000 to $50,000.

Our Forests That Were*

By B. T. McBAIN

Nekoosa-Edwards Paper Co.

TREES of the forest grow by forming new layers of wood directly under the bark. Trees are as queer in picking out places to live and in their habits of growth as are the people of the world. Some trees do best in the icy North and others in the warm climates; yet one will not live if transferred to the other's home.

Trees are necessary at the headwaters of streams. The trees break the force of the rain and the forest floor, acting as a sponge, absorb rainfall and prevent runoff and floods. The spring uprisings of the Mississippi, Ohio and Missouri Rivers are due largely to the lack of forest trees at their headwaters, and many floods in other sections of the U. S. are due to the removal of the forest cover on the watersheds. A grave danger threatens Western farmers sometime in the future, when the trees at the headwaters and on the watershed have entirely disappeared.

Our forests are exposed to destruction by many enemies, the worst of which is fire. From 8 to 12 million acres of forest lands annually are burned over by destructive fires. These are caused by sparks or hot ashes from locomotives. Lightning strikes many forests and ignites many trees. Settlers and farmers set fires in order to improve grazing. Farmers who are cleaning land start brush fires and they become uncontrollable. Campers, tourists, hunters and fishermen are responsible for many forest fires on account of failure to extinguish camp fires. Sparks from logging engines, cigars and cigarette stubs and burning matches start many fires.

Forest insects and tree diseases occasion heavy losses each year to standing timber. It is estimated by the Forestry Department that over 100 million dollars loss results each year in the United States forests from insects alone.

Our forests were so abundant, when the early settlers landed, that it was almost impossible to find enough cleared land in one tract to make a 40 acre farm. These forests were considered a menace and an obstacle and viewed as an enemy. At one time we had the richest forests in the world. Today, millions of acres contain neither timber nor young growth; but can be restored if proper measures are taken on a National scale and would ensure an adequate supply for all time.

In Alaska there are two great National Forests said to contain nearly 21 million acres and about 70 billion feet of ripe timber. The Pacific Coast Northwest States also contain much timber of great value and in quantity. These, however, are too far distant for use here in Wisconsin and other middle and Northwest States and cannot be considered.

Our National Forests include 147 separate bodies and cover 156 million acres. There are eight District offices with general headquarters at Washington, D. C. The rapid depletion and threatened exhaustion of the timber supply in the more thickly populated sections of the East and Middle West has prompted several of the States to initiate action toward the conservation of timber resources.

Wisconsin has nearly 400,000 acres of State Forest land. Minnesota has about 330,000 acres. Michigan has about 20,000 acres.

There are but 4,237,587 acres in State forests in the U. S. according to C. L. Pack, President of the Trees Association or 1½ percent of the cut-over and denuded land of the country, which is useful for tree production. Lack of funds prevents extensive work. Thirty-two States are engaged in forestry work.

The Public Forests are steadily increasing in popularity and are termed "The Playgrounds of the Nation." Over one million people visit Colorado forests annually. About 80 per cent of the people visiting the National forests are automobile tourists.

Of late years the demand for timber and wood products by world trade has been very great. Most of the other countries have taken steps to protect their forests. Some of them limit culling and restrict export. New Zealand and Switzerland have laws of this kind and Canada is talking about it. Sweden exports; but the law forbids cutting of timber in excess of annual growth. England is planting nearly 2 million acres of new forest reserve. France is enlarging her forest nurseries. Even Russia is beginning to practice conservation.

For many years the United States and China were the greatest wasters of forest resources; but America has at last begun to practice scientific forestry. Germany leads in the practice of forestry and German forests are said today to be worth five billion gold dollars.

Must Adopt Suitable Measures to Protect Forests

It has been proven that correct handling of private forests cannot be secured by education alone. It is necessary that suitable measures be adopted to induce private owners to preserve and protect their woodlands.

1st—The timber must be protected against forest fires.

2nd—Timber must be so cut as to aid natural reforesting.

3rd—Cut-over lands must be reforested either naturally or by tree planting.

4th—Tax laws must be changed to induce owners to go into the wood growing business.

The lumberman should practice Forestry. They can do so by practicing better methods. They can harvest their crop without so much injury to the future generation. They can do more toward prevention of fires. They can and should plant trees.

The pulp and paper mill owners who also own timberlands come within this class, also. Those who use timber products and who own no timber, however, should aid in the work of reforestation because by that means alone can they perpetuate the forests and their supply of raw material.

The farmer should practice forestry because a tree crop is a profitable crop but farmers as a class, usually neglect their woodlot. Farmers should prize their woodlands because they not alone provide building material for fences; but supply fuel for the farm house. Any surplus can always be sold in the form of standing timber, saw logs, posts, poles, ties, or pulpwood in cordwood or bolts.

A farm forest is also a good protection for the farm buildings from windstorms and other ravages of winter, besides providing work for all during slack periods.

Mr. Pack, in his book on Forestry says there are 200 million acres of farm woodlands in the United States, while in the Northern States alone some 53 million acres yield incomes of over 162 million dollars annually to their farmer owners.

Of all the farmers reporting in the last census, they had sold an average of $82.00 worth of tree products a year. In this same report it was learned that about 78 million cords of firewood are burned annually on the farms of the country, or an average of 11½ cords per farm. The farmers of nine states, including Wisconsin, sold an average per State of over 15 million dollars worth of lumber and other forest products from their farm woodlots in a single season.

Of course, there is needless waste of wood in all wood-using industries and the pulp and paper industry is no exception. In fact, I think we are among the worst, but the Forest Products Laboratories of the U. S. and Canada, are gradually showing up these wastes and laws in some States have helped correct this evil. For their own protection and pocket book, the Pulp Industry should do more and that should be one of the aims of our Association work, for waste is the worst evil with which we have to contend.

Our original forests covered 822,000,000 acres. Today we have only about one-sixth of them left. The U. S. Forestry Department says that all forest land now in the U. S., including culled burned and cutover lands totals, 433,000,000 acres. The merchantable timber in the United States today is estimated as 2,215,000,000,000 feet. The rest is second growth timber of poor quality. One-half of this timber is in California, Washington and Oregon.

Our forefathers wasted and destroyed our forests. We are doing the same. We must call a halt and begin all over again.

The land owners, the States and the Federal Government must get together and make a big drive for reforestation laws and action. The public has a large interest at stake. Foreign governments have solved the problem; but we in America have been used to let the future take care of itself in everything. This cannot continue.

Our forestry problem is first fire prevention and protection, then put to work millions of acres of idle land that is not useful or needed for farm crops.

Again quoting Mr. Pack:

"If we are to remain a nation of timber users, we must become a nation of wood growers."

*Data compiled from various Government reports and C. L. Parks' book on Forestry, and presented at the meeting of the Board of Directors of the Wisconsin Forest Protective Association, Wausau, Wis., November 22, 1923.

After November 19, the Philadelphia Division of the B. F. Sturtevant Co. will be located at Thorne & Copewood Sts., Camden, N. J., in a modern daylight building, with Pennsylvania Railroad siding. In this new location they will maintain an up-to-date shop for manufacturing all kinds of sheet-metal work required for the complete installation of Fan Systems including heating, ventilating, drying, exhaust, and conveying work. Guards for machines, pulleys and gears will also be manufactured.

Heat Losses in Pulp and Paper Mills*

Part One of the Progress Report of the Committee on Waste

ONE of the greatest sources of waste in pulp and paper mills is the loss of heat in the various departments of the plants. It is often difficult to trace, especially when adequate measuring equipment is lacking. The steam and power used in the average paper mill represents from one-third to one-half of the conversion cost of the product, and in consequence any continuous loss is a serious matter.

These heat losses, in some form, are found in nearly every department of the mill from the coal pile to the finished product. A majority of them are preventable by study and close control of the heating problem, and their elimination may bring about a material reduction in the cost of making paper. The principal departments in which savings may be effected are the steam plant, chemical pulp mill and the machine room of the paper mill. Appreciable losses also occur in the heating systems throughout the entire plant.

In the following review an attempt is made to point out the most important sources of heat loss and also to suggest possible remedies. Many of the subjects have been discussed by the Heat, Light and Power Committee and in various articles and trade papers. However, this subject is now treated from a heat loss standpoint, and an attempt is made to co-ordinate the available information.

Steam Plant

With the high price of coal and the increased cost of operation, the steam plant has been receiving more attention the last few years than in the past.

Walter N. Polakov, a well known combustion engineer, recently made the following statement: "The application of scientific methods to firing our boilers can save some 150 million tons of coal per year, now wasted shamelessly, for the want of such knowledge by firemen in this country."

The principal losses in a boiler house are due to the following causes:

1. High flue gas temperature.
2. Radiation from the furnace and boiler.
3. Air leaks in the boiler settings.
4. Combustible in ash.
5. Moisture in coal and air.
6. Excessive blow-downs.
7. Inadequate utilization of exhaust steam and condensate.
8. Leaky valves and traps.
9. Radiation from pipes.

(1) The high temperature of the dry flue gases caused by poor settings, leaky baffles and other defective conditions, may be much reduced by the use of economizers and other equipment. In well operated boiler plants the flue gas temperature does not average above 400° F. It has been estimated that every 100° F. rise in flue gas temperature is equivalent to a 4 per cent loss in fuel. Closely allied to the temperature of the flue gas is the control of excess air necessary to obtain the best combustion. The best plants are able to operate with 20 or 25 per cent excess air and 35 per cent is the maximum that should be allowed under any operating conditions.

(2) Radiation from the furnace and boiler is often overlooked in small plants. This is a loss that is continuous and often amounts to 3 or 4 per cent of the total available heat in the coal. The use of special firebrick, water screens and air cooled walls have been important factors in reducing these radiation losses.

The problem of preheating air using stack gases and the heat from the furnace walls has received considerable attention in Europe and is doubtless one of the future power plant developments of this country. It should be possible to make material savings by preheating air with equipment such as the Ljungstrom air preheater or by the use of air ducts in the furnace setting.

(3) Air leaks in boiler settings are unpardonable and make it almost impossible to operate boilers efficiently. This loss is ascertained through regular systematic inspections and can easily be rectified by the mechanical department. Various coatings are used which materially assist in covering the small leaks and at the same time reduce the radiation losses.

(4) The loss due to combustible in ash varies greatly with the grade of coal, type of furnace and method of operation. The study of this problem involves almost every factor of operation. The average plant may easily lose 4 or 5 per cent of the total available heat because of the unburnt coal that goes into the ash pit.

(5) Moisture in coal is a source of some loss, although this may be largely a storage or purchasing problem. The difficulty due to moisture in the air may be partly overcome by special storage methods and periodic checks on the moisture content of the coal.

In recent years the utilization of barking drum refuse as fuel has received considerable attention. In the work of the Waste Committee last year it was pointed out that its efficiency as fuel is greatly increased by reducing its moisture content by pressing. In Europe, refuse and wet bark are dried by using the heat in the dry chimney gases, but this method has not yet been adopted in this country.

(6) The heat lost in blow-downs is of especial importance where very hard or impure water is used. Mills that are fortunate enough to have a supply of pure water for their boilers are able to keep them clean by blowing them down once a week. In hard water sections treatment of feedwater is very important, and often it is possible to pay for a feedwater treating plant in less than two years. Many boiler compounds are on the market, and some materially assist in reducing the amount of scale. The question of scale and blow-downs is a distinct problem in each plant. Many plants use a recording thermometer on the blow-off to show the number and duration of the blow-downs. This serves as a check and also indicates leaky blow-off valves.

Scale is an effective insulator and causes inefficient boiler operation. It has been estimated that a scale of the ordinary thickness up to ⅛ in. may cause a loss in heat transmission of from 1 to 10 per cent, depending upon the individual conditions of the boiler.

(7) The complete utilization of exhaust steam and condensate is very essential to economical operation. All water containing heat should be sent to the feedwater system with small loss of temperature. Where the condensate is above 212° F. it may be returned to the boilers or economizers by direct return steam traps. This applies particularly to the condensate of the paper machine driers.

The development of feedwater heaters has been an important factor in increasing the efficiency of boiler plants. The feedwater is purified to some degree as well as heated, and enters the economizer or boiler at a temperature that makes possible higher efficiency. The importance of high feedwater temperature is indicated by an authoritative estimate that every 11° F. rise in the feedwater temperature is equivalent to 1 per cent in fuel saving.

(8) Losses due to leaky valves, pipe joints and traps are often overlooked, especially when located in inaccessible parts of the plant. A very small leak will result in an appreciable loss in the course of a month or a year. A steam leak ⅛ in. diameter will cause a loss of over 12,000 lb. of steam per month at 100 lb. pressure. A steam leak ⅜ in. diameter at the same pressure will waste 460,000 lb. of steam per month, which at 60 cents per thousand pounds equals $276. Defective and incorrectly placed traps are also a source of heat waste and are not given sufficient attention.

(9) Losses due to radiation occur to some extent in the boiler house as well as throughout the entire plant. These losses are caused not only by poorly covered or bare steam pipes, but also by hot water pipes that do not have proper insulation.

Among the important developments in the field of combustion engineering that results in a saving of heat or in a higher efficiency are the use of fuel oil and powdered coal. The results from various paper mills which use fuel oil indicate that it is possible to maintain a higher boiler efficiency with comparative ease than is possible in the ordinary hand or stoker-fired plant. The use of powdered coal is a recent development, and is very similar in operation to that of oil because the pulverized fuel burns as gas and the combustion is nearly complete.

Operating data in one oil-burning plant show an average efficiency of approximately 84 per cent. The results in burning powdered fuel at the Lakeside plant of the Milwaukee Light and Railway Company indicate that it is possible to operate at an overall efficiency of nearly 85 per cent.

The relation of "per cent overall efficiency" to dollars is easily illustrated. The coal consumption of a 100-ton paper mill is approximately 3,000 tons per month, and the steam plant efficiency may vary from 60 per cent to 75 per cent. The following table indicates the possible approximate monthly and yearly saving for a 5 per cent increase in efficiency with coal at the cost indicated.

Increase in efficiency	Coal cost per ton delivered	Saving from increased efficiency	
		Per month	Per year
5%	$5.00	$750	$9,000
5%	7.50	1,125	13,500
5%	10.00	1,500	18,000

One of the most important factors in obtaining a high efficiency is the use of the improved equipment that is avail-

*Presented at the meeting of the Technical Association of the Paper and Pulp Industry, at Appleton, Wis., October 26, 1923.

able. Economizers, superheaters, stokers, feedwater regulators, soot blowers, draft regulators, and other equipment assist the operator in more completely utilizing the available heat in coal. The use of steam flowmeters and other recording instruments greatly assists the engineer and firemen in obtaining high evaporating efficiency. Boiler meters of the Bailey and Republic type that record the steam flow and air flow on the same chart make it possible for a fireman with even limited knowledge to maintain the best combustion conditions. A permanent record is made, and the recording chart serves as a check on operating conditions day and night. The recording CO_2 meter is also a valuable instrument in the steam plant.

Much experimental work has been done on the mercury boiler although as yet it has not been developed on a commercial basis.

High pressure steam accumulators are being extensively used in Europe, and during the past year have been installed by one of the large paper companies. This equipment absorbs the temporary and excessive steam demands and results in an increased steam plant efficiency.

Sulphite Mill

The major part of the steam consumed in the sulphite process is used in the digesters. The cost of steam per ton of pulp produced varies from $4 to $8, depending upon the grade, operating conditions and other factors.

Probably the greatest source of heat waste in the sulphite mill is in the blow-off steam which is usually exhausted to the atmosphere. Some attempts have been made to reclaim a portion of both heat and chemicals by special condensing towers. The cost of the necessary equipment is quite large, and the value of the reclaimed heat and chemical is not sufficient to justify the economical application of this method except, perhaps, in large plants.

One of the most recent developments in the reclamation of heat in the cooling process is the "Decker system," which diverts the relief gas and liquor into a spare digester filled with chips and fresh acid. This reclaims much of the heat as well as some of the relief acid. The only changes necessary to use this system are sometimes the addition of an extra digester and slight change in cooking methods.

The use of the steam flowmeter for cooking control has been found to result in a reduction of steam consumption.

Another source of heat loss is the radiation from the digester shell which has been estimated to be ¾ to 1 B. T. U. per hour per degree difference in temperature per square foot of surface. It is now possible and practicable to cover digesters with insulating material in the form of asbestos mats. They are made in sections about 7½ by 3 ft. that conform to the shape of the digesters. Each section is held by hooks at the butt straps of the digester and adjacent sections are laced together with copper wires. When it is necessary to inspect the digester shell, the wire is removed and the lower edge of the mats swung out. By the use of digester insulation it is possible to reclaim much of the radiant heat, although a portion of it is necessary to heat the building during the winter months.

A conservative estimate of the radiation losses from a 10-ton digester is 7,000 to 8,000 lb. of steam per day which at an average cost is equivalent to from $4 to $5 per 24 hours.

Soda and Sulphate Mills

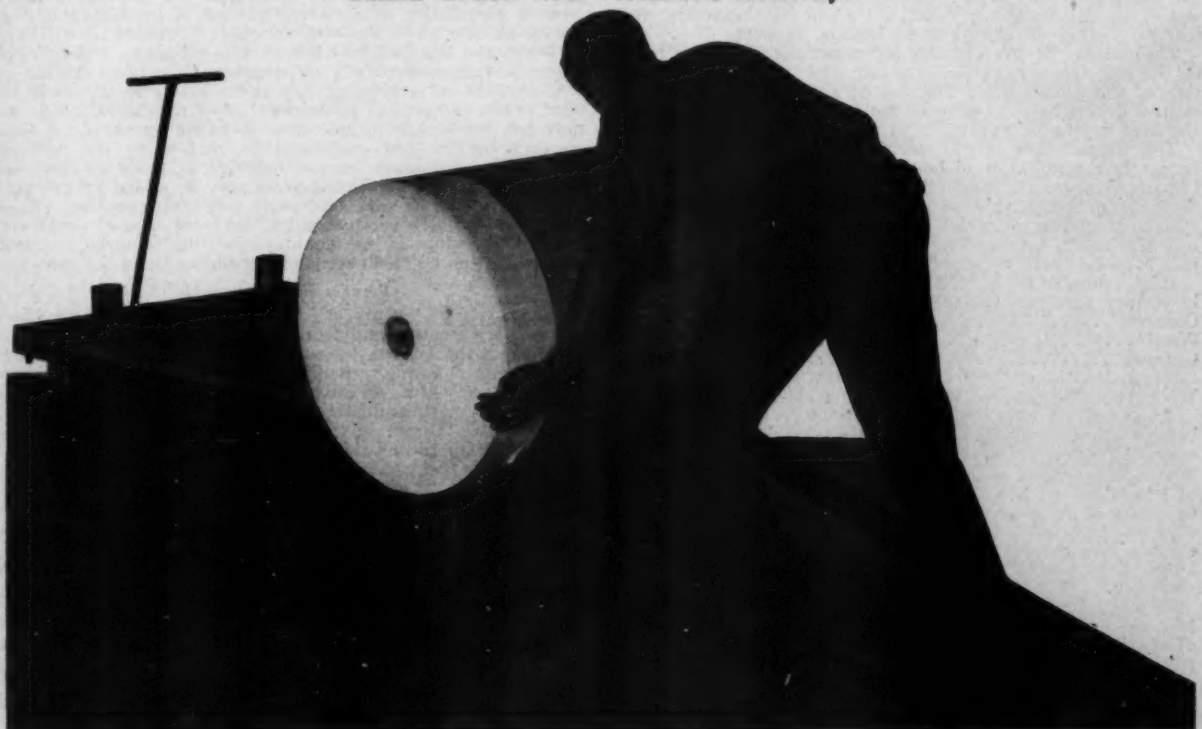
The heat loss in the blow-off of the digesters in soda and sulphate mills is similar to that of the sulphite process, although some attempt has been made to reclaim the heat by means of a condenser.

The application of the Decker or a similar system may be possible in the case of stationary digesters so that a portion of the heat in the relief steam may be reclaimed.

The heat lost by radiation from the digesters in the soda and sulphate processes is greater than in sulphite because no lining is used and higher pressures prevail. It has been estimated to be about 3 B. T. U. per hour per degree difference in temperature per square foot of surface or nearly three times the radiation from sulphite digesters.

Further losses in the sulphate and soda processes occur in the smelting furnaces, rotary burners and evaporators.

Hand Truck with Attached Rollways



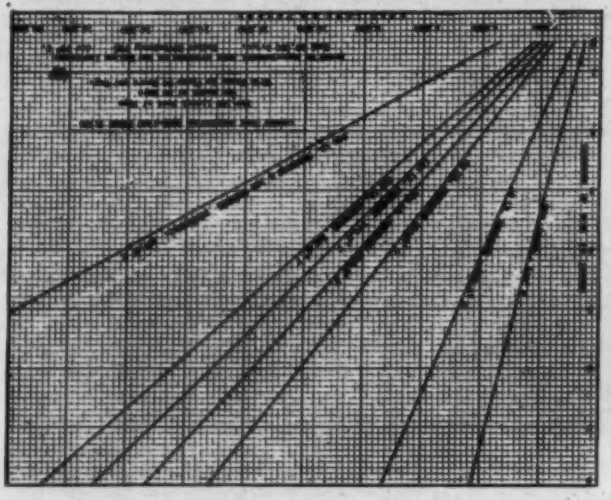
A truck equipped with iron rollways which slide under the truck body, is a labor saving device employed at the Marathon Paper Company of Rothschild, Wis. These rollways can be pulled out and used either when rolls are on the floor, giving it an upward incline, or when rolls are on the rewinder platform, giving it either a straight or downward incline.

As these rollways are attached to the truck, there is no looking around wondering what was done with them the last time they were used. As there are no direct lifts, one man is all that is ever needed to handle the rolls. This little attachment pays for itself many times over in saving the time and effort of two men, which would be required to lift a heavy roll from the floor; or time wasted in looking for a rollway which has been misplaced.

Waste-heat boilers have been used quite successfully to reclaim heat from the smelting furnaces and rotary burners.

Paper Mill

Probably the greatest loss in most paper mills is the heat going out the machine room roof in the form of vapor from the driers. The control and reduction of this loss are closely allied to the ventilating problem. The waste-heat economizers, which heat the incoming cold air by the condensation of the outgoing vapor, reclaims about 85 per cent of the heat from the machine room vapor. They have been installed by a number of mills and are more effective in cold weather when the steam requirements of a paper mill are greatest.



Various methods have been tried out to reclaim the heat in the machine room vapor, including the use of a spray of water on the outgoing vapor. Future developments may bring out other effective heat-reclaiming systems.

The various drying systems for paper machines are based on the complete circulation of steam and the efficient utilization of the condensate. The use of automatic apparatus to control drying helps to prevent the excessive use of steam and the over-drying of paper.

The temperature in the machine room is very high, consequently the radiation of heat from the roof and walls is an important source of loss. Some modern mills have adopted the gypsum roof with good results. A few mills have used a special insulating material in combination with a wood or a concrete roof. Various tests indicate that the heat transfer in a 3 in. roof will be approximately as follows:

Heat transfer in B. T. U. per hour per degree difference in temperature per square foot of surface:

Concrete	0.65
Wood	0.32
Gypsum	0.22
Concrete (with two layers of insulating material)	0.24
Wood (with two layers of insulating material)	0.17

Assuming an average temperature differential of 45° F. between the machine room and outside air and an average over-all efficiency of coal utilization of 6,800 B. T. U. per pound, a saving of 0.41 B. T. U. by using two ¾ in. layers of insulation on a concrete roof is equivalent to nearly 12 tons of coal per year per 1,000 sq. ft. of roof surface. Moreover an insulated concrete or wood roof would have less tendency to drip and the wood roof might easily last several years longer due to more favorable atmospheric conditions and less sweating.

Another important source of heat loss is the use of excess air in ventilating the machine room. Every cubic foot of air that goes through the monitors must be heated from the temperature of the outside atmosphere to that of the vapor discharged through the roof. Any excess air causes inefficient operation in carrying the moisture away from the paper machine and consequently results in a loss of heat. This is an engineering problem that involves the use of hoods and ventilating equipment to suit the conditions.

General Mill Losses

Many small heat losses occur throughout the entire plant that amount to an important total in a year's time. Leaks from valves and piping, waste of condensate from small engines, heating systems, losses due to radiation from uncovered steam and hot water pipes and losses due to faulty design and construction of buildings and equipment are common.

The insulation of bare pipes except the main live steam lines is often overlooked. The following chart is based upon the results of an extensive investigation on the heat losses of bare pipes made by the Mellon Institute. The losses are converted to pounds of coal per month per 100 lineal feet of bare pipe at varying temperatures and pipe sizes.

Process for Moulding Paper Containers Perfected

The entire paper industry is familiar, more or less, with the attempts that have been made in the process of moulding containers and vessels from pulp, but few have been informed that this process is no longer in its elementary stage, but has been perfected to such a state where quantity production is assured.

In 1915 an inventor by the name of Drake, assisted by his son, began experimenting on this process. After a period of two or more years they succeeded in developing a process by which they were able to mould the pulp into shapes of an almost unlimited variety, with an even deposit over the sides, top and bottom in a manner so simple and effective that it startled the whole pulp and paper and allied industries where it was known.

This initial machine used for moulding containers from pulp was hand power. Of course, Mr. Drake realized something faster and more economical than hand power was necessary, so he went to work on an automatic machine that would stand great pressure, but which would still be simple in its operation and composed of comparatively few parts. During the experimental period, four models set up were dismantled and disregarded and the present is the fifth model, which Mr. Drake feels confident is just the thing for the purpose, being more simple in construction than the other models, and containing one-fourth of the number of parts found in the fourth model.

Unlimited Possibilities

The possibilities of this invention seem almost unlimited, as any shape desired that will clear a mould can be blown by this process from pulpy material, the product can be treated chemically afterwards, making it greaseproof, also hardening the fibre for other purposes, making it as hard as wood, and the fact that the work is all blown and finished under a temperature of 700 degrees Fahrenheit makes it sanitary, the waterproofing having no taste, no smell and no odor to the contents of containers. Any number of machines may be installed in a line and operated by cams. A belt conveys the finished containers to bins or to the packing room. The automatic carton machine is made in units of from two up, and additional units may be added by connecting them to the driving shaft with a flexible coupling. Each unit can be made to turn out a different shaped container, merely by changing the mould. The time required for each article is from 30 to 60 seconds, depending upon the size.

Process Fully Patented

Every step of the process and also the automatic machines have been patented, and there are a number of other patents pending in the United States. Patents have also been granted to several foreign countries. Various types of closures have been patented, and also a process for waterproofing the product by the introduction of an inexpensive chemical combination into the beater, the product being waterproofed when it drops from the moulds.

Following are a few of the innumerable articles that can be made, many of which are being made by the Drake process: Cans, boxes, toys, balls, novelties, textile cones and bobbins, cuspidors and linings, conduits, conveying pipes, special shaped boxes, copyrighted shapes for every purpose, rotors and stators for radio work, electrical insulations, phonograph horns, shipping containers, waste paper baskets, fruit baskets, cigar boxes, hardware boxes, milk bottles, egg holders, etc.

Drake Process Incorporated, Cleveland, Ohio, are the manufacturers of this machine, and already there have been licenses granted to a number of companies which are actively engaged in the manufacture of the numerous products which can be made on it.

The Voorhees Rubber Mfg. Co., Jersey City, N. J., manufacturers of mechanical rubber goods, tubes and accessories announces the opening of a branch and distributing store at 605 Wayne St., Detroit, Mich., under the management of D. H. Cassell. A full line of mechanical rubber goods will be carried in stock to take care of the Michigan, Northern Indiana and Ohio trade.

Motor Drive and Control for Beaters

By O. C. CORDES,
Westinghouse Electric & Manufacuring Co.

THE beater, which in many instances may rightly be called the heart of the paper mill, is one of the oldest known pieces of apparatus used in the paper making industry. It is here that the pulp or "furnish" is prepared and worked to the proper consistency to be made into paper. From the time of its inception, during the infancy of the paper industry, the beater has changed but little from its original form, except for certain improvements making toward greater efficiency and capacity. The principal of operation, however, as originally conceived is still intact.

Fig. 1—Beaters driven in pairs by 125 H.P. 285 R.P.M. Westinghouse slip ring induction motors

The horsepower required to drive a beater varies considerably in the different paper mills, and depends very materially upon the kind of paper being made. Let us consider a 2,000-pound beater only in this article, as in most cases the H. P. required may be considered very nearly proportional to the size and the capacity of the beater for the same method of operation and the same kind of stock; also let us consider that alternating current is only available since the majority of mills are so equipped.

Where the beaters are used only for mixing the stock, water color and size, and most of the work is done in Jordans, a 50 H. P. motor of the wound rotor type should be large enough. In those paper mills where most of the work is done in the beaters, a 75 H. P. motor of the wound rotor type will need to be used for such papers as news, book and kraft. Rag paper and felt may require as much as 125 H. P. Also, some special types of beaters will need as much as 150 H. P. Where the beater is used as a broke engine, the horsepower required will vary between 75 and 125 H. P., depending upon the kind of paper being made.

Motors of the wound rotor type are generally recommended because of the high starting torque obtainable and also due to the fact that the starting current is much less than that required by a squirrel cage type of motor. The high starting torque is required to start the stock in the beaters circulating, which, although the rolls are up, presents a very considerable amount of inertia to be overcome.

The control used for the wound rotor motors consists essentially of an oil circuit breaker for the primary side and a drum type controller for cutting in and out resistance in the secondary circuit. This equipment, together with an ammeter, may all be mounted on a slate panel and located in a place accessible to the operator. The secondary circuit of the motor is so interlocked with the primary oil breaker that, should the resistance be cut out of the secondary circuit, the motor cannot be started until the drum controller is returned to the full resistance in position. This feature makes it impossible to connect the motor to the lines unless the secondary resistance is all cut in. Since the beater is a constant speed drive machine, the control equipment supplied is for starting duty only and consequently will not permit the motor to run at reduced speed, except during the starting period.

Driving Beaters

There are two principal approved methods in vogue today for individually driving beaters, i. e., belt and silent chain type drives. Other drives involving ropes and sprocket chains are very few and are used mainly in old mills where line shaft drive is still in use. Individual motor drive has many advantages over line shaft drive. First, all line shaft power losses are eliminated; second, should a motor fail or a drive give away, only one particular beater unit is shut down while the rest of the equipment continues to operate; and third, the space saving is very considerable, and the beaters may be arranged and set in a way best suited to obtain the maximum efficiency and consequent increase in output of paper. Oftentimes where the beaters are close to each other, one large motor with double extended shaft is located between each pair of beaters and drives them through belts from pulleys mounted on the shaft extensions.

Such an arrangement is very satisfactory and saves room and expense. Silent chain drives are coming more and more into the foreground as a beater drive medium, especially since some very successful installations have been made. Some advantages of silent chain type drive are that the motor can be brought up close to beater roll shaft, thereby saving a very considerable amount of space, and a higher speed motor can often be used, which, of course, also means a less expensive motor. The saving in space feature, however, is of value only where the paper mill is crowded. The inherent characteristic of the silent chain drive is that it does not have the resiliency of a leather or rubber belt and consequently will not take up shocks caused by foreign materials such as stone, tools, and metal getting caught between the beater roll and the bedplate. In the case of the silent chain type of drive, this shock is transmitted directly to the motor bearing and consequently may damage it or the motor shaft. This condition can be taken care of to a large extent by using special soft metal pins between the chain links. The function of these pins is to shear in case of a heavy overload on the motor caused by the roll lifting, because of foreign materials getting into the

Fig. 2—150 H.P., 575 R.P.M., Westinghouse squirrel cage motor driving two beaters through chain drive

beater. This method helps to protect the motor very materially and the sheared pins can be replaced in a very few minutes. A geared drive is not feasible for this application as the beater roll is raised or lowered to obtain the proper refinement of the stock and also foreign material getting under the roll may cause it to jump.

In general it may be said that a fixed rule pertaining to horsepower requirements for beaters of certain sizes and operating on similar material cannot be laid down, as much

Fig. 3—Lenix idler type belt drive of beaters in pairs with 150 H.P., 435 R.P.M. slip ring type motors

depends on the design of the beater, the kind and character of the stock, its consistency, and last but not least the individual ideas of the beaterman. Therefore, in making motor applications each case should be studied and handled as an individual problem, taking into consideration the conditions peculiar to the plant in which the beaters are installed.

Forestry as a Training for Citizenship

That boys "ought to be kept in a barrel and fed through the bunghole until twenty-one years old," was denied by R. S. Kellogg, Secretary of the News Print Service Bureau, who spoke recently at the New York State College of Forestry, Syracuse University, on "Forestry as a Training for Citizenship." Mr. Kellogg said that the quarter of a century of forest schools in America had shown the liberalizing effect of taking boys into the open and bringing them in close contact in a scientific way with nature. He said that those who had remained in the profession, as well as the foresters who have gone outside of it, generally had made good, and one of the secrets of their success was in keeping close to the dirt, which has a tendency to free the mind from illusions. The forester must learn Nature's laws and act in accordance therewith.

Mr. Kellogg declared that there was no easy road to success in forestry. Work consists in moving against resistance; hard conditions breed strong characters and weaklings cannot follow the blazed trail said Mr. Kellogg. Nature cannot be cheated and the forester must have the three qualities of good citizenship laid down by President Roosevelt—honesty, courage, common sense. He cannot cheat Nature. He must have the courage to tackle new problems and the common sense to adjust class room theory to the infinite variety of nature. Character, capacity and capital, together with hard work with both hands and head are essential to business success.

Where Science Is Leading

Mr. Kellogg said that science is remaking the world, but it is not known yet whether it will carry forward or destroy civilization. He said there is a constant war between the constructive and destructive forces within human society with many other forms of life warring against mankind. The speaker asserted that if man is the final flower of organic evolution, it will be because he finally learns how to get along with his fellows. There is supreme need in the world for men of engineering training to find the facts before acting, for men of such ability who can take the lead in public affairs. The half-baked theorist who turns clever phrases is one of the greatest public menaces.

Mr. Kellogg said that it was unfortunate that thousands of tons of white paper and millions of good spruce trees are yearly employed in spreading mis-information, prejudice and scandal. There is little basis for controversy when all the facts are known on any subject. We are only beginning seriously to consider the fundamental problem of human relations, of how men should live and work together, of how they should conduct themselves, if the complex that we call modern civilization is to endure. There is no substitute for the old fashion virtues of honesty, thoroughness and willingness to work, no short cuts to wealth and happiness that are substantial.

A man has the right to work for whoever he chooses and to hire whoever he chooses. Employees and employers have a right to organize for the promotion of their respective interests, but neither has the right to use its power to the injury of the public. The closed shop, union or non-union is ethically wrong, and the flat union scale economically unsound. The only just payment for labor is based upon quantity and quality of product.

Men Not Created Equal

There is no such thing as men being created equal except in the spread-eagle speech of the Fourth of July orator. The inalienable right is that of opportunity. Never will there be equality of accomplishment and reward, socialistic theory notwithstanding. Sound progress will not come from crusades inspired by ignorance and fanaticism. Bolshevism and Ku Kluxism are present examples of "wolf trees" in the social forest, with which the world has always been cursed. The forester sanely favors the useful species and removes those which hinder the growth of their betters.

The scientific spirit keeps one close to the facts. We are not called upon to construct a theory of the universe upon every well-attested fact. Many factors are involved in every result. Evolution teaches that progress is gradual. A better is progress towards a best. Sudden, radical changes are not to be expected because the future has its roots in the present. The forester is fortunate in his training in the scientific spirit, in his understanding contacts with nature, in the constant necessity for keeping his feet on the ground, and he is

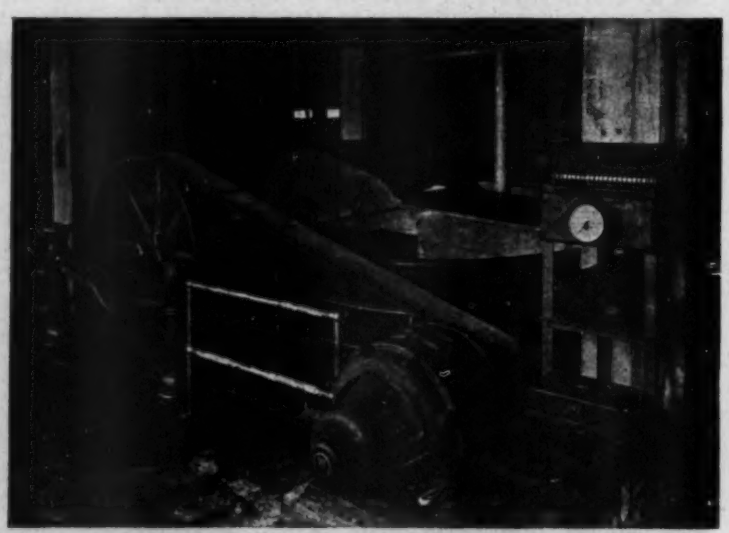


Fig. 4—Broke beater driven by 50 H.P., 385 R.P.M. Westinghouse slip ring induction motor

no credit to the profession if he is not a better than average citizen.

New Crawler Tread Portable Loader

Capable of cutting a path twenty feet in width, through a pile of material by means of the swiveling feature, is the astonishing claim made for the new crawler tread, power-swiveling, industrial loader recently put on the market by the Link-Belt Company of Philadelphia.

This new industrial loader, illustrated by the accompanying photograph, is of large capacity and is built for heavy duty.

The new feature of this loader is the crawler tread. This type of tread has proved eminently successful, and its application to the industrial loader is a distinct improvement because of the frequent necessity for moving such loaders over railroad tracks, rough and broken ground, piles of loose material and up inclines.

While adding the crawler mechanism another feature was incorporated—that of making the lower base of solid cast-steel construction. This feature eliminates the numerous rivet and bolt connections and makes for greater durability and rigidity. The lower base, which carries the loading mechanism, pivots on the tread in a similar fashion to that employed by the larger and more expensive locomotive cranes.

Tread shoes are of alloy, heat-treated steel, cast in one piece, and are attached by a patented design which has proved exceptionally capable of self-cleaning. In the past, it is said, the one fault with mechanisms of this type was their liability to clog with dirt, sand, mud, etc. A self-cleaning tread has been adapted, which, it is claimed, makes such clogging impossible.

One of the principal features of this loader is its ability to swivel and swing independently of the wheel or tread base. It can back into a pile, dig, swivel and elevate at the same time—or it can do any of these operations independently—all at the will of the operator.

The steering mechanism of the crawler tread is controlled by a hand wheel, all other operations being controlled by levers which are conveniently located on the operator's platform on the upper swiveling frame.

The capacity of any loader will vary of course, with the material handled. For the "Grizzly" (as this is called), however, a capacity of 45 cubic feet per minute is claimed while handling bituminous coal. It is driven by a motor of ample power and of standard design.

An Indicator of Forest Fire Hazard Devised

A duff hygrometer is an instrument for measuring moisture in the forest floor developed by the Forest Service, United States Department of Agriculture. Its importance in dry weather in the forests is evident, for upon the degree of dryness of the very inflammable material composing the forest floor can readily be estimated the fire peril. M. E. Dunlap, moisture control specialist of the Forest Products Laboratory, Madison, Wis., and H. T. Gisborne, assistant silviculturist of the Priest River Forest Experiment Station, Missoula, Mont., devised the duff hygrometer after two years' work.

The instrument consists of a perforated metal tube approximately one-quarter inch in diameter and twelve inches long. This tube contains a strip of rattan which expands and contracts with changes in moisture content of the material with which it is in contact, and registers on a dial at the upper end the changes which may take place in the material being studied. The shorter end of the tube is inserted into the needles and litter on the forest floor along the plane in which a determination of moisture content is to be taken.

The instrument may be left in place and readings made directly from it at any time, or it may be moved about freely to different situations. Preliminary tests at the forest experiment station show this instrument will give a reading of moisture content up to about 40 per cent. As fire danger does not occur when the top layers of this forest litter has over 25 per cent moisture content, the range given by the instrument is sufficient for predicting dangerous fire conditions.

If the device proves satisfactory this summer, it probably will be used throughout the entire West on the national forests where dangerous forest fire conditions are likely to occur. The importance of these instruments can be realized when it is remembered that most forest fires start and spread in the litter before they develop into a serious conflagration.

Simonds Announces 3rd Economic Essay Contest

Mr. Alvan T. Simonds, president of the Simonds Saw and Steel Co., of Fitchburg, Mass., has announced his Third Economic Prize Essay Contest, which is open to pupils of high, normal, and trade school students in the United States and Canada. $1,500 in awards will be divided up into nine prizes, as follows: First prize, $500; second prize, $300; and seven other prizes of $100 each.

The essays are to deal with the income of the people of the United States. The total annual income of all the people of the United States is quite definitely known as the result of careful studies by various competent organizations. In 1922 it was approximately fifty-eight and one-half billion dollars. The population of the United States was, in 1922, approximately one hundred and ten millions. The annual income was, therefore, about $530 for each man, woman, and child before the payment of taxes, which took one-eighth of it, leaving a net average income after taxes of $464.

Shall the total income be divided equally among all, and each man, woman and child receive $464, plus $66 to be paid to the government in taxes? Shall the total income be divided so that each shall receive according to his needs? Shall it be divided so that each shall receive that part of it that he has actually earned? Shall each individual receive in income according to how much he has contributed to the general welfare?

Human effort and economic forces now determine the division of the income and the share of each individual. Can a better plan be devised? How should the annual national income be divided? What would be the ideal division of this income? What would be the possible practicable division that would come nearest to this ideal? These are the questions that the students will be asked to answer. The essays must be in English and written as clearly and forcibly as possible, and in length shall not be less than 5,000 words nor more than 15,000 words. No essay received after May 31, 1924, will be considered. Complete information concerning this contest can be obtained by writing to the Simonds Saw and Steel Company.

Will Use Snow Motor in Logging Operations

Those of the paper industry who are interested in the Armstead Snow Motor, which was described in detail in our November issue, will have a chance to view this machine in logging operations this winter.

The International Paper Company have arranged to have one of these machines in operation at their Piercefield properties, near Tupper Lake, in New York State. No better test than this could be made to prove the worth of this motor to the paper industry.

This striking difference

shows why Barreled Sunlight remains white when other paints turn yellow

"Why can't a white paint be made that won't turn yellow after a few months of service?"

Hundreds of men who buy interior paint for paper mills have asked that question.

The illustration at the right shows clearly why most white paints *do* turn yellow soon after application and why we can make the substantial guarantee—

Barreled Sunlight, the Rice Process White, will remain white longer than any gloss paint or enamel, domestic or foreign, applied under the same conditions.

Resists dirt, also

Barreled Sunlight will not only remain white longer than other paints, but it produces a surface so smooth that it resists the smallest particles of dust and dirt. Even after years of service it can be washed like white tile.

Flows freely and may be applied by brush or spray. Will not chip or scale. Where more than one coat is required, use Barreled Sunlight Undercoat.

Sold in barrels and in cans. Send for our booklet, "More Light."

For beater rooms and places where excessive fumes prevail, Chemic Enamel, a special form of Barreled Sunlight, is recommended. This is smooth and washable also.

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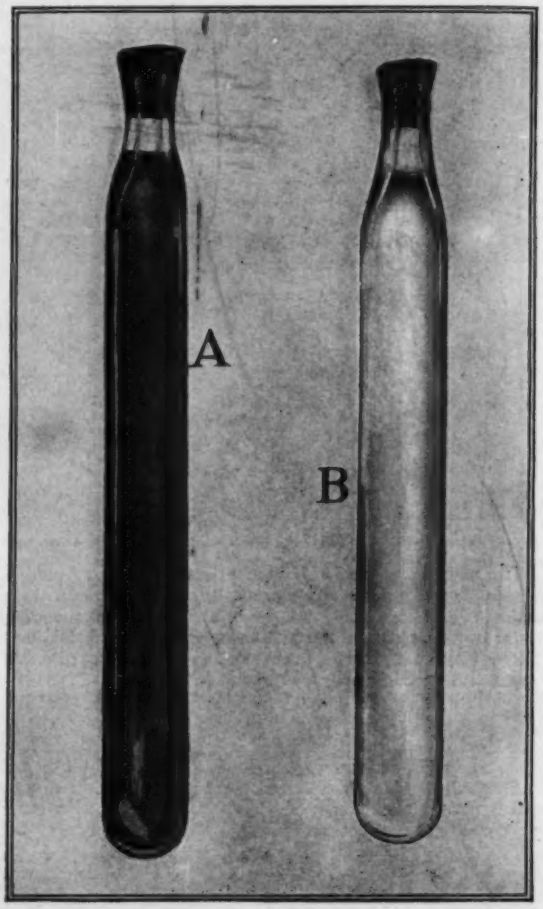
And 100 other distributing points in the U. S. A.



A. *The vial on the left contains refined linseed oil such as is used in the vehicle of the highest quality oil paints. It is deep amber color. (Note the darkness of the photograph.)*

B. *On the right is the same oil after being treated by the "Rice Process." It is almost colorless. This is one of the secrets of the lasting whiteness of Barreled Sunlight. (Reproduced from an actual photograph.) We shall be glad to exhibit the two vials upon request.*

Barreled Sunlight

THE RICE PROCESS WHITE

New England

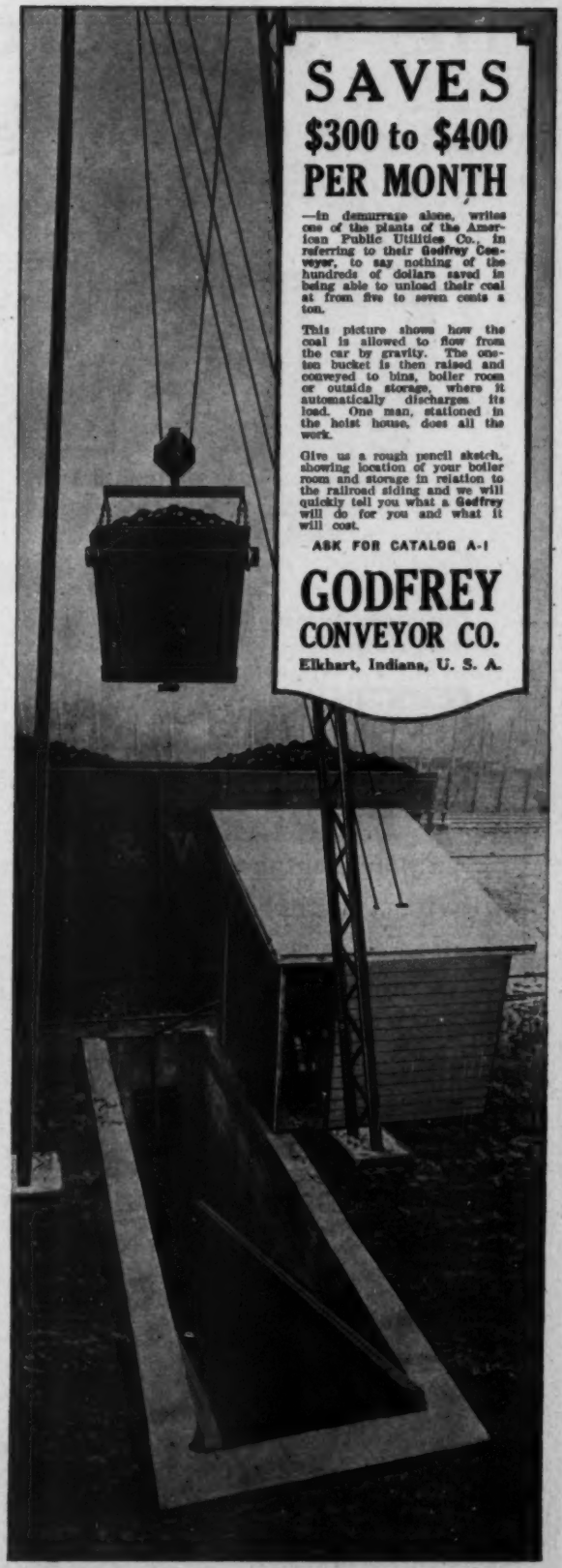
Boston, December 1, 1923.

The New England Freight Association, on November 18, heard some important testimony from a group of New England paper mills regarding rate and classification changes of far-reaching importance. It would not be putting it too strongly to say that the existence of the tissue paper industry, to a very large extent, hinges on more equitable treatment by the railroads. The Boston & Maine Railroad had proposed to increase the c. l. minimum on tissue paper from 24,000 to 30,000 lbs., and on toilet paper in rolls from 30,000 to 36,000 lbs., to grant in return a sixth-class basis of freight rates rather than fifth class. In Hinsdale, New Hampshire, a small town in the southwestern part of the state on the Ashuelot River, a tributary of the Connecticut River, there are a large group of tissue paper mills which for purposes of protecting and promoting mutual interests have formed a council. Their representative at the hearing before the New England Freight Association in Boston, declared that the increased minimums proposed would drive their mills out of New England. They are a group that ship 180 tons of paper per day, and which paid in revenue to the railroads over $250,000 last year. Citing of innumerable shipments proved the impossibility of loading an average freight car to anything like the proposed minimums. This would mean less carlond or 3rd class rates on tissue paper, which would put the Hinsdale group completely at the mercy of the mills west of the Hudson that are under no such restrictions, and that with the advantage afforded by their freight rates would easily undersell the New England producers in their own market.

Somewhat less vital but equally interesting was the proposals of the International Paper Co. for all its New England mills, the Continental Paper & Bag Co. for its Rumford, Maine, mills, and Brown & Co., that they receive the same basis of rates on all proportional paper rates to Boston as is granted the S. D. Warren Company at Cumberland Mills. This latter concern is but five miles from tidewater at Portland and consequently has been given a special commodity rate to Boston, that is actually 82.3 per cent of sixth-class rates. The other mills sought this basis for their shipments of printing and wrapping paper and 90 per cent of this basis for news print, inasmuch as news now moves at 90 per cent of sixth-class rates, which is the general basis on printing paper. The fact that the Cumberland Mills to Boston rate is "water compelled," that is, forced low because of steamship competition, was energetically disputed by Mr. A. W. Campbell, traffic manager of the International Paper Company. The Continental Paper & Bag Co. put in a special plea for lower proportional through-rates to Boston and Portland from Rumford, Maine, on water shipments to the Pacific Coast. All these matters were taken under advisement by the New England Association and a decision will be rendered later.

The American Writing Paper Co.'s affairs are not particularly bright from the standpoint of the six per cent first mortgage bondholders, according to a statement issued by Josiah F. Hill, 44 State St., Boston, secretary of the committee for these bondholders. The committee reports that less than half of the $9,293,000 bonds outstanding have been deposited and the committee therefore extends the time to January 10. The book value of the mills, water rights, and all tangible property of the American Writing Paper Co. is about $14,000,000, less depreciation, but nothing like that amount could be realized in forced sale of the real estate. In a letter to George C. Lee, chairman of the bondholders' committee, S. L. Willson, receiver of the company, states that recent examination of the property by experts showed that the plants were generally so out of condition that it would require a minimum expenditure of $800,000 to put them in a condition with which the necessary quality of paper to compete successfully with other companies could be produced. For really efficient production, a much larger amount would be necessary.

F. W. Dean, representing the Erie City Iron Works of Erie, Pa., has been active in spreading the gospel of pulverized coal burning among mills in New England. He is New England representative. The Pejepscot Paper Co. at Pejepscot, Me., installed the Erie City Co.'s apparatus last spring and report gratifying success to date. They have effected saving in coal bills, and report far less dust than under hand firing systems. Mr. Dean has actively pushed pulverized coal burning by speaking before the National Cotton Mfg. convention in Boston and before the New York state Paper Mill Superintendents.


SAVES
$300 to $400
PER MONTH
—in demurrage alone, writes one of the plants of the American Public Utilities Co., in referring to their Godfrey Conveyor, to say nothing of the hundreds of dollars saved in being able to unload their coal at from five to seven cents a ton.
This picture shows how the coal is allowed to flow from the car by gravity. The one-ton bucket is then raised and conveyed to bins, boiler room or outside storage, where it automatically discharges its load. One man, stationed in the hoist house, does all the work.
Give us a rough pencil sketch, showing location of your boiler room and storage in relation to the railroad siding and we will quickly tell you what a Godfrey will do for you and what it will cost.
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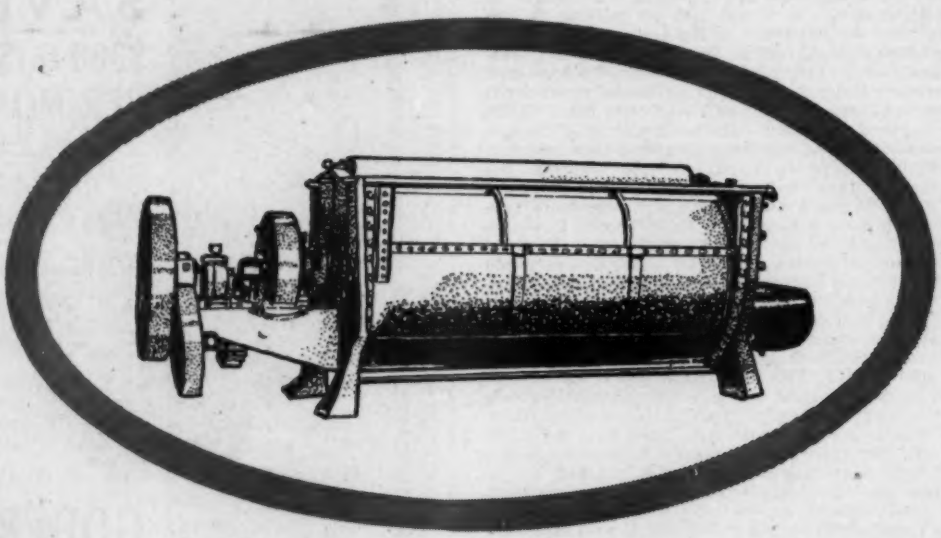

THE P. A. P. A. Screen has again demonstrated its superiority. A No. 2 Pulp Screen has just been installed in the Canadian mill of one of the largest pulp manufacturers in America. Equipped with .013 cut plates it is giving a daily capacity of 17.4 tons or 1.4 tons more production than any other make screen in the mill. It is furthermore effecting a great saving in power, for where the P. A. P. A. is taking only 5 Horse Power, the other centrifugal screens are requiring 20 to 25. P. A. P. A. screens save power, increase production and improve quality.

Complete information and literature will be cheerfully forwarded upon request.

Valley Iron Works Company

Plant:
Appleton, Wis.

New York Office:
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Builders of Niagara Beaters, High Speed Holland Beaters, Cylinder Board Machines, Fourdrinier Machines, etc.

Thomas F. Garvan has caused a summons sent for the appearance in the Superior Court, at Hartford, Conn., of John S. Garvan and other members of P. Garvan & Co., to answer to charges of mismanagement of the company's affairs in connection with which judgment of $200,000 damages is asked, and an injunction preventing John S. Garvan from acting as president and treasurer of P. Garvan, Inc., and judgment declaring that Thomas Garvan is the president and treasurer of the company, and has been since December, 1921. P. Garvan, Inc., is the largest packer of paper stock in southern New England, and members of the Garvan family have been interested in various paper mill properties in Connecticut. Thomas F. Garvan is the owner of the Hartford Board Co. and president of Thomas F. Garvan, Inc. Hearing was had on Tuesday, December 4.

Hollingsworth & Whitney Co. of Boston are now starting their big paper and pulp mill project at St. Stephen, N. B., just across the international boundary from Maine. The mills will be located on the St. Croix River. Borings and drillings are now going on in the process of selecting a site for the buildings. Soundings have been made in Milltown along the stream with a view to determining the water flowage. Hollingsworth & Whitney recently acquired considerable land at this point in New Brunswick, in addition to large new holdings of timberland on the upper St. Croix River. The company contemplates the erection of one of the largest mills in Eastern Canada.

Bird & Son, Inc., report a most remarkable year of expansion to date in their fibre case division. This is a high grade paper board manufactured by them and also converted in their mills into packing cases. Their manufacturing capacity in this division was doubled early in the year and the enlarged output has been sold at all times since to capacity. They are completing a new floor covering plant this fall and there is now talk that an even greater output of paper board may be needed, necessitating further enlargement of the plant.

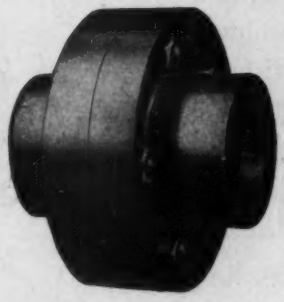
Brown & Co., well known kraft and sulphite manufacturers of Berlin, New Hampshire, confirm from their Portland office the report of purchase of additional land, totalling 2,000 acres in Palm Beach County, Florida. This makes their total acreage in that state 75,000. This will be used for the growing of peanuts, the oil of which is to be mixed with waste hydrogen from their big pulp mill at Berlin, from which is evolved a cooking fat that is distributed on a national scale throughout the country.

The Boston Paper Trade Association held its annual fall meeting at the Exchange Club on Thursday evening, November 22. Charles L. Underhill, Congressman from Massachusetts, made a very interesting and timely address on "More Government in Business and Less Business in Government." Rev. Henry H. Crane, traveler, took as his subject: "Business at the Bat," and kept his listeners in close attention by his timely and pointed remarks. The meeting was well attended, considering the bad weather prevailing.

Reparation has been awarded by the Interstate Commerce Commission against the Maine Central and Grand Trunk railroads, to the International Paper Co., on rates charged on 151 car loads of spruce pulpwood moved from Kennebaga, Maine, to Berlin, N. H. The rate charged was sixth class, and 5.5 cents above the commodity rate that should have been assessed. Reparation to the extent of 5.5 cents per hundred pounds was awarded.

Interesting data as to the pulpwood reserves of Maine have just been made available by the Maine Forest Service, after an extensive survey of the state. They found that there are eleven billion six hundred and thirty mill standing cubic feet of spruce, two billion, seven hundred and eighty-one million feet of fir and poplar, or one million one hundred thousand cords. Nine-tenths of the spruce and fir are classified as woodpulp timber.

Officers of Hollingsworth & Whitney Co., Boston, declare that while engineers have been investigating water flowage and other matters in connection with the water power and building site purchased by them in St. Stephen, New Brunswick, it will not be followed by immediate building operations. Owing to the high cost of building at present the talked of pulp and paper mill to be constructed on this site will be deferred for some time.



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Designed to withstand severe lineshaft service. Flanged so that the workmen's clothes will not become caught on the bolt heads or nuts. Machined all over to template, making them interchangeable, and therefore easily duplicated.

Interchangeability
is a feature that has made

THE T. B. WOOD SONS CO. LINE

of Power Transmission Machinery the standard in so many of the country's largest plants.

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It contains some interesting and useful data on POWER TRANSMISSION APPLIANCES and the problems which beset the user.

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THE HYTOR VACUUM PUMP FOR FLAT BOX SERVICE

Vacuum Produced Absolutely Without Pulsation

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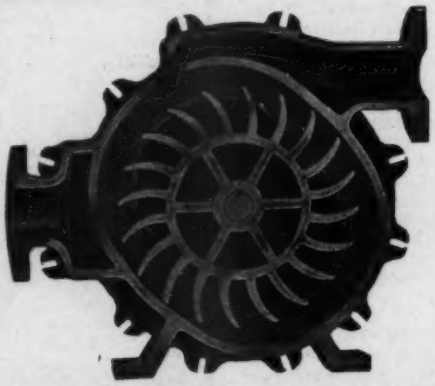

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No Rods, Pistons, Crank Shafts, Loose Moving Parts, and No Gears

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A specific quantity of water guaranteed for a certain price

OUR ASSOCIATE COMPANIES

IN ORDER to better serve our customers with Layne Pumps and Layne Water Systems, we have seen the desirability of getting the "brains closer to the jobs." We have accomplished this thru the organization of associate contracting companies made up of tried and proven members of the Layne & Bowler organization—men of both technical and practical engineering training—men who are able to "cope" with the difficult problems that arise in attempting to procure ground water in maximum quantities. Our success in the last analysis depends upon service rendered to the customer. These men realize this, and we feel that we are in better position by this arrangement to serve our past customers and to do better work for new ones. These men are anxious to do it.

For serving the trade in various territories we have created:

Layne-New York Company, 50 Church Street, New York City	New England States, New York, New Jersey, Pennsylvania	Layne-Southeastern Company, 316 First National Bank Bldg. St. Petersburg, Florida	Georgia, Florida, Alabama
Layne-Bowler Chicago Co. 37 W. Van Buren Street, Chicago, Ill.	Illinois, Minnesota, Wisconsin, Iowa, Michigan	Layne-Central Company Memphis, Tennessee	Tennessee, Mississippi, Kentucky
Layne-Ohio Company, Wyoming Station, Cincinnati, Ohio	Indiana, Ohio, West Virginia	Layne-Texas Company, 3605 McKinney Avenue, Houston, Texas	Texas
Layne-Arkansas Company, Stuttgart, Arkansas	Arkansas and rice territory of Missouri	Layne-Louisiana Company, Crowley, Louisiana	Louisiana

LAYNE & BOWLER COMPANY

Factories:

Memphis, Tenn. Houston, Texas Los Angeles, Calif.

Edwin P. Lindsay, president of the Advance Bag & Paper Co., of Howland, Maine, must pay $52,300.80 in damages to the Nashua River Paper Co., according to a decree entered in the Suffolk (Boston) Superior Court by Judge Weed. Judgment was rendered on account of Kraft pulp sold by Lindsay to the Nashua River Paper Co. in 1918 and guaranteed as No. 1, but which proved to be of inferior grade.

L. L. Brown Paper Co., of Adams, Mass., well known fine paper manufacturers, in a statement given to the Boston News Bureau of the paper business outlook, declared that business has fallen off since September 1, though in their lines some improvement has set in, but poor business generally is bound to adversely affect paper business sooner or later.

It is reported that a large pulp and paper plant will be erected on the St. Croix River at St. Stephen, N. B., Canada, by the Hollingsworth & Whitney Co., of Boston, Mass. It is understood that this company recently acquired extensive timber lands on the Canadian side of the upper St. Croix River.

The Great Northern Paper Co. takes another forward step by co-operating with the University of Maine in giving practical training in forestry in its woods camps. The course will be conducted this winter at Rainbow township where the Great Northern will have extensive cutting operations.

Improvements have been started on the mill of the Rogers Paper Mfg. Co., of Manchester, Conn. The improvements include the installation of a mechanical drying department, circulating system, and other work. The J. O. Ross Engineering Corp. will be in charge of machinery installation.

Slight reductions in sulphite writing papers marked the past month in New England, owing to lower coal and pulp costs. Another feature of the price situation was the cut of one-half cent per pound in kraft, effected by Brown & Co.

An excellent statement submitted by the Millers Falls Paper Company of Millers Falls, Mass., shows a surplus of $109,550, in addition to $103,805 reserved for taxes, for the past fiscal year.

The Northern Timberland Co. of Augusta, Maine, which will deal in pulp timberlands, has been chartered with $200,000 capital.

Stream Pollution

Recognition of the position of the paper manufacturer that there should be a thorough investigation of the principal phases of the water pollution problem before an attempt is made to legislate on this matter has been given by the National Coast Anti-Pollution League in a suggested program which recommends a detailed survey as to present physical conditions, research as to methods eliminating pollution with reasonable conferences of particular industries involved. Mr. Sedley Hopkins Phinney, representing the League, has discussed this matter with Dr. Hugh P. Baker, executive secretary of the American Paper and Pulp Association, and has shown that the program of the Anti-Pollution League is not such as to mean improper legislation without a definite knowledge of all the conditions involved.

At the 1921 Congressional hearings, Secretary Hoover urged that there be an investigation of an exhaustive character and declared that any general prohibition of pollution as against all forms of pollution was desirable at the present moment without more information. He added, "We might be doing in some localities infinitely more damage to industry and to commerce than the value of any fishery that could be established would warrant."

Dr. Baker, in appearing at some of the hearings, said that the paper industry was greatly interested in this subject because of its own need for large quantities of good, clean water, but that before any legislation is enacted, there should be a more definite knowledge than there now exists as to the actual effects of what the ignorant casual observer might suppose to be pollution.

"Electric Motors—How to Choose and Use Them," is the title of a booklet published by the Reliance Electric and Engineering Co., of Cleveland, O. This little booklet contains many helpful pointers on the right way to take care of electric motors.

STEEL

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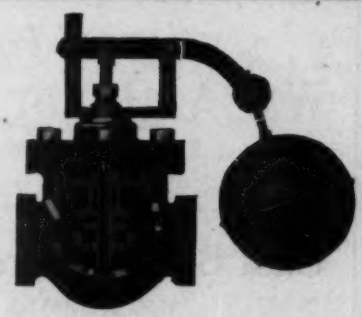

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And these features are typical of the refinements that set *Davis* Valve Specialties distinctly apart from just "valve specialties."

The G. M. Davis Regulator Co., 414 Milwaukee Avenue, Chicago, will send a catalog that will show you how Davis Specialties will save.

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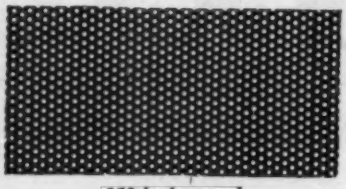
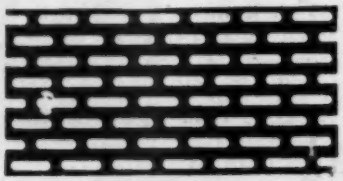
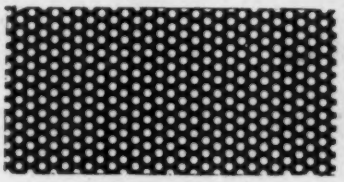


.065 inch round



⅛ x ½" Slots



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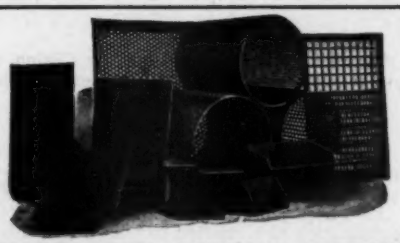

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POWER SECTION

Power Plant Design

By JOHN F. FERGUSON
Ferguson Engineers, Chicago

IN THE last few years there has been a decided move for greater over-all plant efficiencies. Although considerable advancement has been accomplished along this line, yet the activities in this field have merely been started. These possible gains cover every branch of the paper industry, but this article will deal only with the subject of power, including heat.

The paper industry, in general, is a long way behind in most respects in this branch, not due to the lack of opportunities offered by the industry, but due to the lack of experts or specialists to see these opportunities, and lack on the part of paper manufacturers to adopt or undertake any new developments in equipment or methods of operation. While the paper industry is slow to consider any departures from the old established rules and methods adopted by the pioneers of the industry, yet it is gratifying to know that some of the more up and coming manufacturers are seeking these new ideas, and it is on these few that the success and advancement of the industry depends a great deal. The higher prices of fuel and raw material and lower labor efficiencies have, to a great extent, forced these changes, and the manufacturer who has yet to be convinced of the newer developments will sooner or later adopt some of these measures or go out of business.

Present Plant

Let us first look into the old fashioned paper mill as regards the power system. We see in the boiler room a row of boilers of small size and low pressure (125 pounds per square inch or less), horizontal or vertical type, generally of the fire tube type, but occasionally a water tube type. These boilers are hand-fired and have furnaces scarcely larger than an ordinary cook stove; coal comes in either by a wheelbarrow or through some chute, and goes out by several different routes, a great per cent going out with the ashes as ash and unburned fuel; out of the stack as unburned fuel and lost heat; by heat lost in radiation from the exposed surfaces; and a small part as heat in the form of steam to the prime movers, process of manufacturing, drying, and heating of the buildings. The prime movers in the all-steam-driven mill generally consist of a slow speed releasing Corliss engine, belt or rope driven to the beater line shaft, and from which shaft all the equipment of the mill (including any electric generator for lighting, etc.) is driven either by belt or through a series of belts, countershafts, gears, etc.; a Corliss or throttling governor engine, driving through large cone pulleys; or a throttling governor twin engine to the variable speed end of the paper machine, with another Corliss or throttling governor engine driving the constant speed, or wet end, of the paper machine and pumps connected with same.

It will be noted that the greater share of our paper mills are getting along with this old fashioned system throughout, and many of our new mills, just recently built, or in process of building, although they have departed to some extent from the older methods, or perhaps have gone to something worse, more complicated and expensive and lower in efficiency in some respects, are still a long way from being up-to-date or securing the best results.

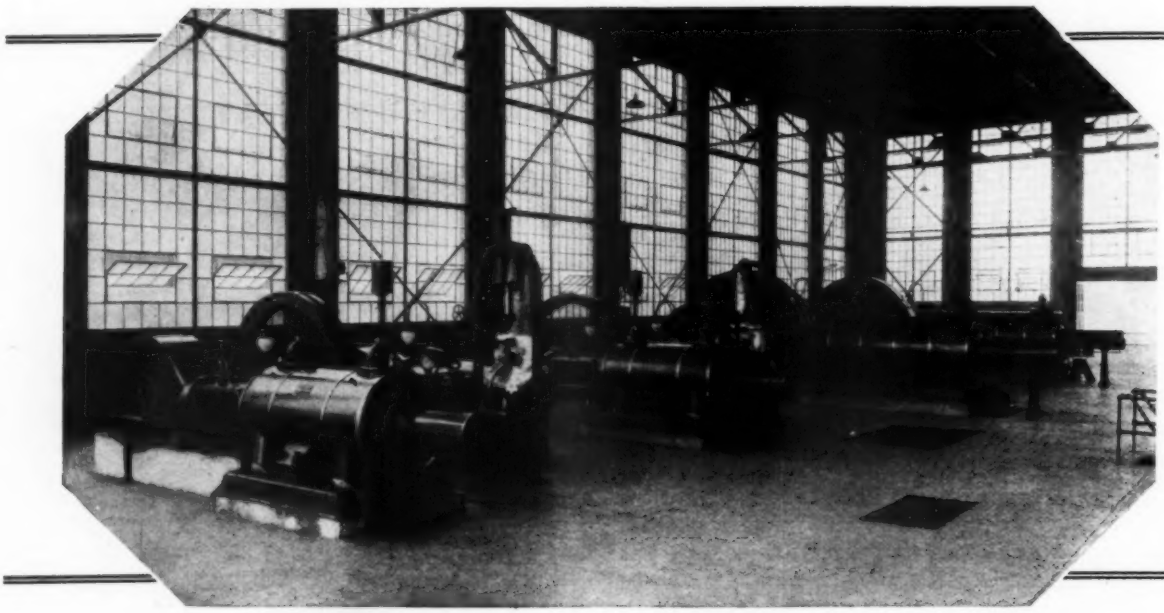
To keep the power system of the mill up to date in every respect would be impossible in these days of progress, because it would not always pay to remodel or change a plant when built, in order to incorporate any new development or improvements in equipment and plant design.

New Boiler Plant Features

Now, to consider a new, up-to-date power system for an all-steam driven mill. The location of the steam plant should be as near to the machine room, where the greater part of the steam is used, as railway facilities and fuel handling and storage conditions will permit. The initial cost and operating losses are greater in transmission of steam and heat than in the transmission of electric power.

The boiler plant will consist of water tube boilers, a small number of larger boilers being more preferable than a large number of smaller boilers, on ac-

NORDBERG



For power economy—the NORDBERG Uniflow

The Nordberg Uniflow Engine embodies the results of over thirty years of engine-building experience, study and research. In these engines, all the Nordberg designing skill, master workmanship and high grade materials are united in a prime mover that for economy of steam consumption under variable loads has not been equalled.

Nordberg Uniflow Engines have established their reliability and low maintenance cost in varied industries throughout the country. They are suitable for operating either condensing or non-condensing, the change easily being made while in operation. The Nordberg Uniflow utilizes any available steam pressure, any superheat, any degree of vacuum or works against any back pressure.

The above installation shows four Nordberg Uniflow Engines which operate with a steam pressure of 150 pounds with 100° superheat. Like all Nordberg Uniflow Engines they are especially adapted for high steam and back pressures such as found in paper mill service.

Nordberg Engineers will be glad to give their unbiased recommendations for the economical solution of your power plant problems. Bulletin RY-1 will be sent for the asking.

NORDBERG MANUFACTURING CO.
Milwaukee, Wisconsin

NORDBERG MACHINERY

Uniflow Engines	Corliss Engines	Compressors	Diesel Engines
Blowing Engines	Condensers	Mine Hoists	Special Machinery

count of the lower initial investment, less space occupied, lower maintenance costs, lower labor cost of operation and higher operating efficiency. This is particularly true in the paper mill, where the load factor is very uniform, but not always so desirable in some other industries. Two boilers in a plant, with one in operation, is generally sufficient for plants with steam demand of less than 15,000 pounds per hour, or a fuel consumption of 1 ton of coal per hour; three boilers, with two in operation, from 15,000 up to 50,000 pounds per hour; four boilers, with three in operation, from 50,000 up to 100,000 pounds per hour, and six boilers being sufficient in the largest plants. Paper mills as a rule have boiler capacities installed much beyond what is required for operation and reserve capacity if they were properly designed, installed and operated, and proper consideration were given to the use of the steam.

Furnaces will be large enough to allow for complete combustion of the fuel used under the condition of such fuel and method of firing same; preheated air will be used regardless of class of fuel, insuring complete combustion with the minimum excess air and minimum furnace space or volume. The design of boiler and furnace should permit of absorption of a large amount of radiant heat from the furnace, to protect the furnace brick work from excessive combustion temperatures. If coal is used as a fuel (and this will most likely be the case, except along the coast or in some of the Southern states), furnaces will be stoker fired, using the multiple retort, underfeed type, for burning the higher class Eastern bituminous and sub-bituminous grades of coal, and the chain grate type for burning the lower grades of bituminous, semi-bituminous and lignite of the Central West and prairie states. One item very often overlooked in boiler plant design is to provide sufficient stoker capacity for the boiler and fuel in question. Powdered fuel, although very desirable for certain industrial uses, loses some of its advantages when applied to the paper industry.

Air preheaters are more desirable than economizers in reducing the temperatures to increase the over-all boiler efficiency, on account of their much lower first cost, less space required for installation, lower maintenance cost with equal efficiency, and further, these same air heaters can be used for heating air for the paper machine, or machine room, or some other part of the building. Where economizers are considered, some advantages in results can be gained by using longer tubes and a parallel flow of gases through the tubes.

Mechanical draft will be required, as natural draft is obtained only by large heat losses and represents a most extravagant method of producing power, since draft and any heat used for this purpose cannot be recovered. Mechanical draft is generally lower in first cost. Most engineers and manufacturers are inclined to spend too much money in smoke stacks, which should only be considered as a flue to conduct the waste gases above the adjacent buildings. The amount of heat expended to obtain natural draft is many times the amount of heat, or equivalent of same, expended in mechanical draft of the most efficient type. The type of fan selected will depend upon the service, whether for forced draft or induced draft, the space available for installation, and whether such fan is required to operate in parallel with other fans or not. A fan, too small for its service, will be extravagant in the use of power. Both forced and induced draft system will be required in order to obtain the proper furnace regulation and control under the varying conditions.

Boiler pressures will be decided by the type of prime mover used and the class of paper mills served, which determines the ratio between power demand and steam demand for process, heating and drying. In no case, however, regardless of the previous or present installation, would we consider less than 200 pounds per sq. in., for even if never used, the additional metal in the boiler will be more than justified by the longer life and lower maintenance costs.

All boiler room auxiliaries, such as forced and induced draft fans, boiler feed pumps, air compressors, and any mill service pumps, should be motor-driven, with, of course, a steam-driven boiler feed pump, and, perhaps, one or more other steam-driven reserve or emergency auxiliary units. The motor drive for auxiliaries simplifies the plant and reduces the heat losses to a minimum, and besides, such units can be operated more economically when supplied by power through the large main steam units.

Superheated steam, we must admit, improves the efficiency of the prime mover in some respects, but it must also be considered that additional heat must be expended to this steam to produce this superheat, thus reducing the actual evaporation of water in the boiler per pound of fuel, so that the actual over-all gain cannot be determined by the reduced steam rate of the prime mover only, but by taking all the advantages and disadvantages into consideration, including maintenance troubles involved. Superheat in the exhaust, or steam to the drivers, or to a heating system, is undesirable except enough to overcome the losses in condensation in the transmission of the steam.

The coal handling system will depend entirely upon the general design of the boiler plant, the location of the power plant in respect to railway sidings, size and location of coal storage, and ash disposal system desired. Where ashes are to be moved by railway cars, a combined coal and ash handling system of the silent pivoted bucket conveyor type will be best adapted. If the railway track is somewhat remote from the boiler plant, the belt conveyor will be best adapted, with a separate ash handling sys-

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Give a steady flow of power; this is preferred in all types of machinery. Especially so in paper machines, where quiet, steady running of machinery means better paper and low costs.

The FAWCUS Herringbone Gears assure a steady flow of power, eliminate jerking and back lashing common to gears of the spur gear type.

FAWCUS herringbone gears are a solution to the question of applying quiet, steady power to the calenders and other mill equipment.

Fawcus Herringbone Gear Reduction on the Calender

The electrification with Fawcus Herringbone Gear Reductions on the Calenders of the Champion Coated Paper Co., Hamilton, Ohio, has

INCREASED:

Efficiency 15%
Production 20%
Quality .....inestimable

has **DECREASED:**

Wastage on Calenders.....100%
Labor 20%
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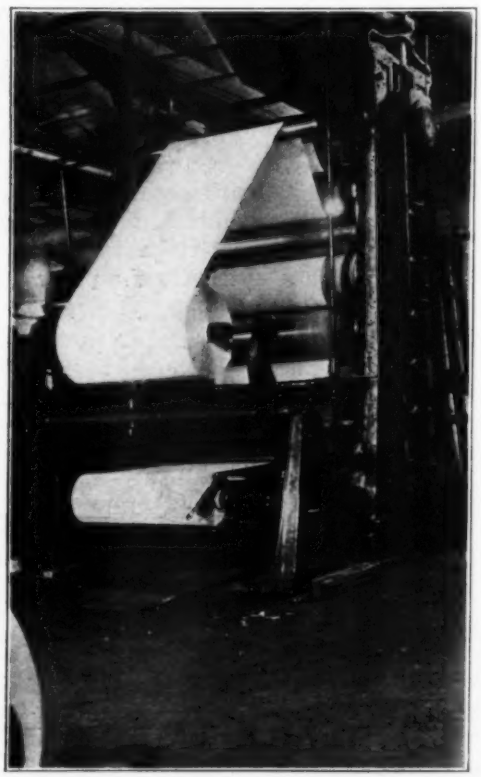
Perfect automatic and variable speed control.

This company will be glad to give the benefit of its engineers' experience in assisting paper manufacturers in developing problems of electrification of existing equipment. Write now.

Special Machinery — Herringbone Gears
Flexible Couplings — Spur, Bevel, Worm Gears



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Portland, Ore., Coast Steel Machinery Co.
San Francisco, Calif., K. W. Eichelberger.

tem, using an industrial dump car or other means as the size of the plant and conditions warrant. An overhead bunker of some capacity to store coal and supply stokers must naturally be considered, the capacity of same depending upon the main storage supply and regularity and dependability of fuel transportation. Some means of weighing the fuel, such as automatic coal scales, are most desirable for checking the daily fuel consumption.

On account of the large amount of power and heat required in the manufacture of paper, power becomes a major item in paper production cost, in some cases running as high as 35 per cent of total cost of production. While these figures are abnormally high, and represent very extravagant conditions, yet even the best mills in this respect are generally a long way from what can be accomplished under their opportunities.

Some mills are fortunate enough to possess certain water power systems in connection with their mill. Such assets are of prime importance for furnishing power to groundwood pulp mills, but may be used to a more successful or profitable purpose in supplying power to public service, where there is a demand or market for such service, than in supplying the paper mill. What is meant by this last statement is that the paper mill can generally obtain a much higher price for this generated water power from public utilities than it would cost to produce the power required to operate the mill, from the resources and opportunities that are within the mill.

Almost any paper mill can be entirely operated just from the steam used in process, heating and drying, although this may demand in some cases a departure from the present general practice, in order to get the higher efficiencies demanded. It may appear from first thought that a greater investment is required to gain the higher efficiencies, but this is not always the case, for the higher efficiency in the utilization of steam or heat, the less steam required and the smaller the boiler plant necessary, and consequently a lower initial cost in most respects.

The future boiler plant will have greatly reduced actual boiler heating surface, having large radiant heating area, high gas velocities through the boiler passes, followed with a series steel tube economizer and air preheaters, permitting of extra high boiler ratings; in fact, actual boiler ratings of 1,000 per cent of what is now termed the standard, will become common.

Prime Movers

Now, in regard to the prime movers in the paper mill. These will differ to some extent with the available steam pressure and temperatures, the class of paper mill, and the ratio of power demand to steam used in manufacturing. Regardless of the size of the plant, it is very desirable to have all the prime movers within a single power station or engine room, not only on account of better facilities for repairing and keeping machinery clean, but also on account of convenience and lower cost of operation, for in some states additional licensed engineers are required when an engine is located in a remote part of the plant away from the main station.

If the plant has two or more paper machines or one very large machine, the electric motor drive for all of the equipment of the mill, including the paper machine, is most up-to-date and desirable from every angle. This will permit the operation of the entire plant, from one or more steam-electric power units in a single engine room as desired, reducing the amount of high pressure steam piping, etc., greatly simplifying the plant and reducing the heat losses to a minimum. The electric drive to the paper machine may be through a single direct current motor or by a sectionalized motor drive, the latter being much more efficient in the use of power, occupying considerably less space and with lower maintenance costs.

If the paper mill has only one machine, and this of small size, it is possible that a Marshal drive to a machine, driven by an enclosed high speed, vertical or horizontal, cross compound, or twin automatic cut-off, variable speed steam engine will prove equally desirable, particularly where such machine engine can be located in the main engine room or adjacent to it, and electric motor drive to all other equipment of the mill, including the wet end of the paper machine.

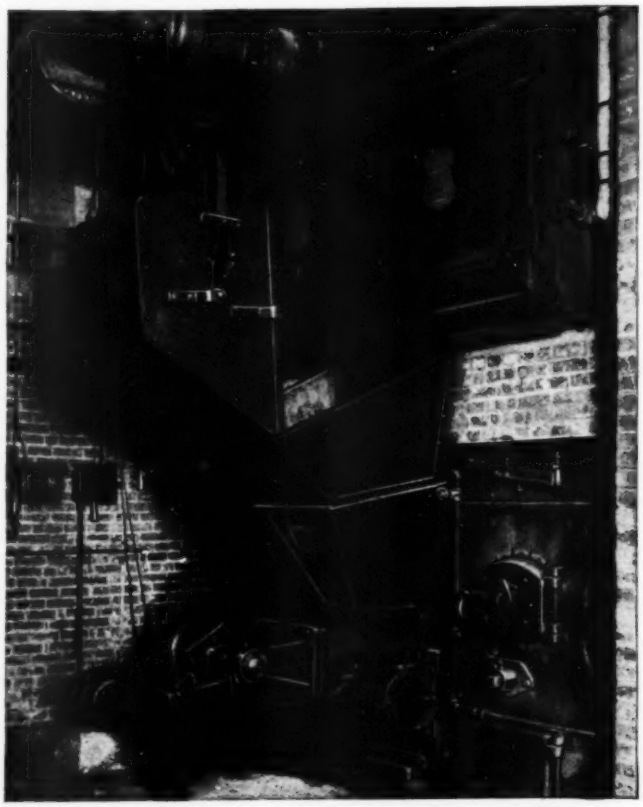
The type of prime mover best adapted to the paper mill in question will depend upon many conditions: the class of paper mill, whether board, book, news or high grade rag paper, as the class of paper governs the ratio of power demand to the steam demand for the mill. In the manufacture of the cheaper class of board the power demand is small compared to the higher grades of paper, and the highest efficiency in prime mover is not so essential, unless there is some other department, such as a box factory, pulp mill section, or a market for the excess power that can be generated from the steam used in manufacturing, over what is required for the paper mill. In such a case, the maximum efficiency is equally desired, as with the higher classes of paper, but let us assume that only the power required for the entire mill is desired or necessary.

The steam rate of the best steam turbines of the size for paper mills is about 20 per cent higher than the high class steam engines of similar capacity and working under equal steam conditions, while the type generally found in our paper mills is considerably greater than the above, so that in order to obtain the same amount of power from an equal amount of steam (exhaust), the initial steam pressure for steam turbines must necessarily be much higher than with high class reciprocating units. As stated be-

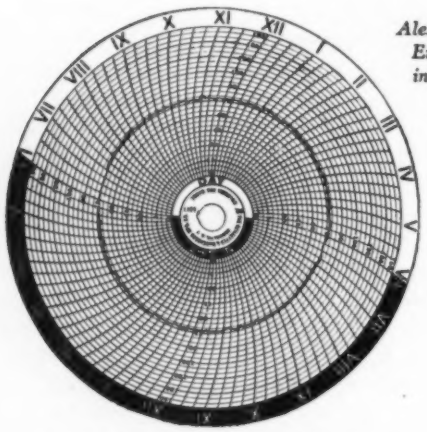
When Enlarging South High School, Youngstown, 60 per cent, they installed a Detroit Underfeed Stoker, and saved 100 Tons of Coal yearly over former practice ~~~~~~

Naturally you would think that the addition of 42,000 square feet of floor space, to a modern school with its high ceilings and large window area, would inevitably increase very materially the coal consumption. This was not the case however at South High, because they put in a Detroit Underfeed Stoker at the same time that they enlarged the building, with the result that the fuel consumption was cut 100 tons a year.

There is nothing surprising in this record. Every user of Detroit Underfeed Stokers will testify that his savings in fuel have been very much larger than he actually anticipated. The reason—Detroit Underfeed Stokers set new and higher standards in stoker manufacture. Their flexibility, ease of control, and the completeness of combustion effected will surprise and delight you.



Alex S. Allen
Engineer
in charge



Note the steady, even steam pressure

Repeat orders for Detroit Underfeed Stokers from:

Youngtown Board of Education	God's Bible School, Cincinnati
Fifth Avenue Building, New York	Burroughs Adding Machine Co., Detroit
American Cotton Oil, Cincinnati and St. Louis	Saginaw Board of Education
Harvey Hubbell Inc., Bridgeport, Conn.	Krippendorf—Dittmann Co., Cincinnati
National Home, D. V. S., Johnson City, Tenn.	Chevrolet Motor Co., Tarrytown, New York
Durant Motors Corporation, Flint, Michigan	Fort Wayne City Lighting Plant,

Made in both single and multiple retort design capable of handling any boiler from the small HRT to the large water tube operated at high ratings. If you want to effect REAL savings in your plant install a REAL underfeed stoker—THE DETROIT.

Ask for Bulletin 242

DETROIT STOKER COMPANY

Underfeed Forced Draft and Overfeed Natural Draft Stokers

242 GENERAL MOTORS BUILDING DETROIT, MICH.

DETROIT UNDERFEED TYPE U STOKERS

ASSURE CHEAPER STEAM PRODUCTION

SINGLE RETORT

fore in a previous article by the writer, "There are very few places for a condenser or condensing unit in the paper mill, except in the high class rag mill," and even in this mill new developments are under way which will eliminate the condensing unit from this type of mill and from the paper industry entirely.

The reciprocating steam engine, although higher priced, will generally be preferred to the steam-turbo prime mover for generation of electric power for the paper mill, mainly on account of its higher efficiency. The type most favorable would be a cross-compound horizontal poppet valve unit, or a multiple expansion vertical (English type) enclosed high speed unit. In some cases a single unit large enough to handle the entire mill will prove very satisfactory, while in other cases perhaps one unit for every paper machine is desired in order to insure the greatest reliability and flexibility. The relative advantages and disadvantages of the different types of engines and turbines, as applied to the paper industry, was dealt with in detail by the writer in the August and September issues of THE PAPER INDUSTRY.

The efficiency of the power system is not always determined by the steam rate of the prime mover, nor by the evaporation rate of water per unit of fuel, but depends to a great degree upon the generation, distribution and application of steam, heat and power throughout the plant.

Power Costs

The amount of steam used for heating the building during winter (which is governed by the location and seasons and general design of building), the preparation of the stock and condition of the material to be dried, and finishing work connected with the paper made, have a bearing upon the steam and power requirements and finally upon the fuel. Practically all of these factors can be governed to a great extent through design and operation of the plant, with the exception of the weather conditions, so that the amount of fuel, of some standard quality, required to produce a given amount of product of a certain grade, represents the over-all efficiency of the power system in a general way.

The following table represents what may be expected in fuel per unit of production, and cost of power per ton of finished product. This power cost includes all fixed charges such as interest on investment, depreciation, taxes and insurance, labor, fuel and all operating charges of power plant supplying all power and heat to the paper mill. The lower figures in each case represent the best results for large plants at the no heating season, and grading down to the smaller mills during the heating season as covered by the higher figures:

Class of product—	Pounds of coal 13,000 B. T. U. per ton of finished product	TOTAL Power cost per ton
Box board (lower grades)	1,000 to 1,350	$ 4.00 to $ 5.00
Box board (higher grades)	1,050 to 1,400	4.50 to 5.50
News (omitting groundwood or sulphite plant)	1,200 to 1,500	5.00 to 6.00
Catalog and lower grade book paper	1,400 to 1,700	6.00 to 7.00
Coated papers	1,600 to 1,900	7.00 to 8.50
Book paper (higher grades)	1,600 to 2,000	9.00 to 12.00
Low percentage rag paper (finished)	1,800 to 2,600	11.00 to 14.00
High grade rag papers (finished)	2,400 to 3,600	12.00 to 18.00

There are many factors which enter into the cost of power production and which vary over quite a range, but the above table showing the amount of coal based on a 13,000 B. T. U. value, at $5.00 per ton delivered, and the cost of power and heat per ton of product, represents what can be expected from the higher classes of plant design and operation, so if you are working at higher figures than the range as listed, it is quite evident that there is room for improvements either in your plant design or plant operation.

If you are using water throughout your mill, the coal consumption should be from 10 per cent lower for box board to perhaps near 25 per cent lower for the highest class papers.

The future power system for paper mills, which is about to be presented to the industry, will permit of lower investment in building and equipment, less space occupied, less labor operating costs, and greater fuel economies, and a much lower over-all power production cost.

Pointers for the Engineer

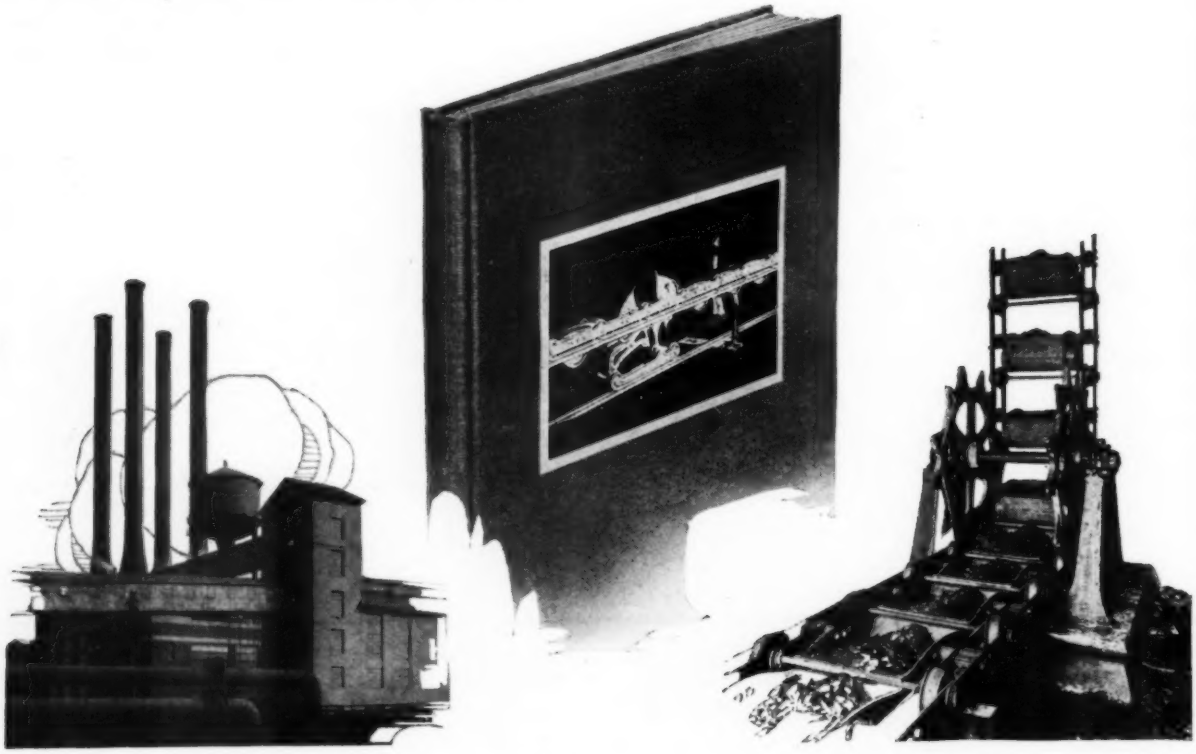
By W. F. SCHAPHORST, M. E.

Boiler Furnace Improvements

AT LAST engineers are "knuckling down" to what has been needed for a long while—they are improving the boiler, the boiler furnace, and things pertaining to the boiler room in general. It has been admitted many times that in the engine and turbine room the limit has about been reached and further refining is not always practical. But the boiler room has been sadly neglected.

One of the most important betterments in the boiler furnace is the overhead arch for improving combustion. It actually **does** improve combustion and increases boiler efficiency. One of its disadvantages has been that because of the high temperature to which it is subjected it soon burned away, exposing the overhead supporting steel work. Engineers solved that by making arches easily replaceable, then they provided an additional safeguard by giving them double thickness, and now there is talk about making

The JEFFREY— Pivoted Bucket Carrier



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and many others.

LEADING Industrial Engineers recognize the Jeffrey Pivoted Bucket Carrier as the highest type, most efficient and dependable Coal and Ashes Handling Equipment.

The design, workmanship, and special methods used in the construction of this Carrier give assurance of proper performance and long life.

No mechanical loader required with the Jeffrey Carrier. The over-lapping lips of the buckets permits a continuous stream of materials to be discharged onto the Conveyor. Many advantageous features and illustrations are contained in Catalog No. 210-W.

You can get a copy of this book by a request on your company's stationery.

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St. Louis, Mo. .....606 Pontiac Bldg.
Pittsburgh .....620 Second Ave.
Detroit, Mich. .....455 Book Bldg.
Milwaukee, Wis. .....M. & M. Bldg.
Boston, Mass. .....141 Milk St.
Chicago .....858 McCormick Bldg.
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JEFFREY
MATERIAL HANDLING EQUIPMENT

the arches triple in thickness. More power to them!

Strange as it may seem, boiler furnace side walls have been allowed to practically "shift for themselves." Furnace builders used to think that if a boiler setting could be made perfectly "air tight," the zenith of attainment was reached. Today, though, designers have suddenly found that boiler walls can be vastly improved. Not only can they be made airtight when new, but they can be made durable despite the high modern furnace temperatures. It has been found that by installing fire brick in the furnace is such a way that the brick are not subjected to stresses and strains, they will give much longer and better service. So, in our latest constructions we now see the outside wall doing all of the heavy work, and even supporting the inner fire brick wall, which is as it should be.

One manufacturer said to the writer not long ago that he soon expects to put something on the market pertaining to boiler furnaces that he declares will "startle the world." Whether or not it will startle the world remains to be seen, but anyway, it is interesting and of importance to the paper mill engineer to follow these very valuable fuel-saving improvements. There are very few, if any, boiler rooms in the world today that cannot be economically improved.

Balata Belts

THE writer has developed a formula for balata belts which is based on a well-known table as published by a prominent belt manufacturer. This is the formula:

$$W = \frac{H}{0.000{,}158\ N\ D\ (P-1)}$$

Where W = width of belt in inches; H = horsepower to be transmitted; N = number of revolutions per minute; D = diameter of pulley in inches; P = number of plies.

This formula is usable for balata belts of 3, 4, 5, 6, 7, 8, 9 or 10 ply.

The accompanying chart will be found useful by the belt user in paper mills for determining the horsepower that will be transmitted by any ply of belt 1 inch wide. It was designed from the above formula.

For example, how many horsepower will a balata belt of 7 plies transmit when running 2,000 feet per minute?

Connect the 7 (Column A) with the 2,000 (Column C) as shown by the dotted line, and the intersection with Column B gives the answer immediately as "a trifle over 7.2 H. P." This is "for each inch of width." Thus a belt 10 inches wide would transmit 72 H. P. when running 2,000 feet per minute.

To show how the chart can be used "backwards" in solving problems that seem more complex, let us assume that you have an engine on which is a 4-ft. pulley, the face being 9 inches wide. The engine runs at a speed of 250 R. P. M. and develops 50 H. P. How many plies should the balata belt contain?

First, to find the speed of the belt in feet per minute, multiply the diameter in feet by 3.1416 and then

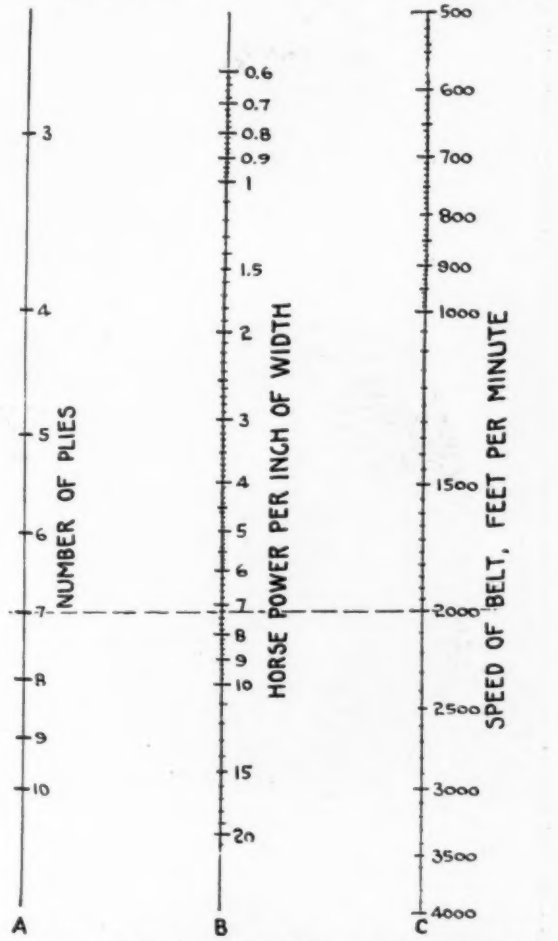


Chart for determining H. P. that will be transmitted by any ply of belt, 1 inch wide

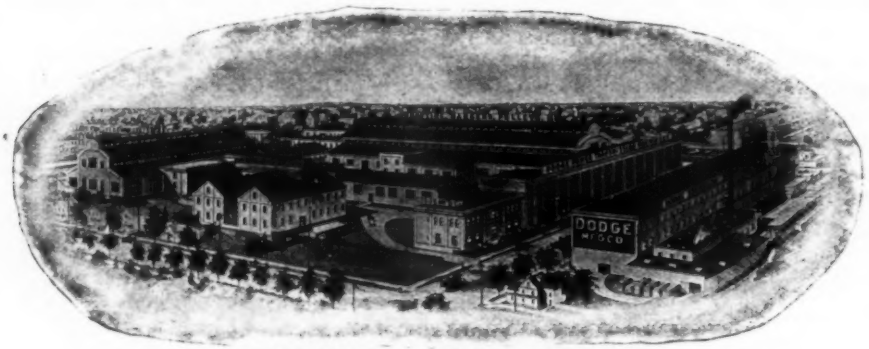
by the R. P. M. We therefore get 4 x 3.1416 x 250 = 3,140 feet per minute.

Next, it is customary to use belts on pulleys that are narrower than the pulley faces. This pulley, being 9 inches wide, we would use an 8-inch belt. Each inch of width will, therefore, have to transmit (50 ÷ 8) 6.25 H. P.

Lastly, connect the 3,140 (Column C) with the 6.25 (Column B) and the straight edge will intersect Column A between the 4 and 5. Inasmuch as there is no such thing as a 4½-ply belt, a 5-ply belt should be used.

Why Do Boilers Explode?

WHEN I was a student in college, nearly twenty years ago, I was a member of a class that was labeled "Steam Boilers" in the college catalog. I recall distinctly that when we came to the subject of explosions it was stated in our textbooks, and our



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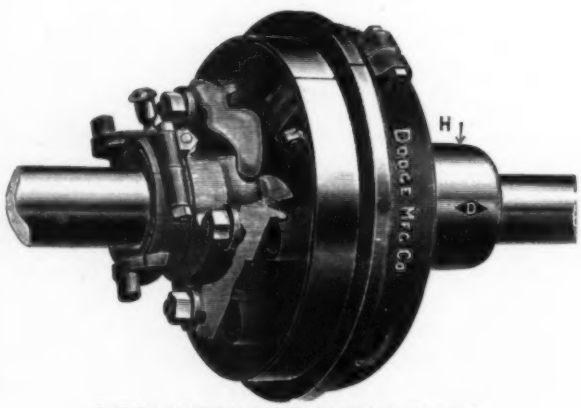
DODGE CAST-IRON ROPE SHEAVE



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Is Friction Reducing Your Production?

Friction is continually trying to obtain a foothold in your mill. He is a sly old fox, and slips into places least expected. Once he gains admittance he starts his deadly work by getting a stranglehold on Power, who wastes considerable force in counteracting him.

There is only one way to fight Friction —never allow him admittance. This can be done by using power transmission machinery scientifically built to insure balance, precision, and durability. DODGE Transmission Equipment is built on this plan. It is built for long service.

The installation of DODGE EQUIPMENT in your mill means much more than merely filling the present requirements—they are always productive of maximum efficiency and economy in power transmission.

We have the most complete line of patterns in Canada covering a full line of Power Transmission and Elevating and Conveying Machinery. Send us plans for Tenders on complete equipments.

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Toronto **Montreal**

professor emphatically told us, that in the "old days" engineers had the notion that explosions were due to the splitting up of water into hydrogen and oxygen, these two elements then igniting and thus resulting in a disastrous explosion.

The writer does not know anybody at the present time who believes that boiler explosions are due to, or even aided by, the disassociation of oxygen and hydrogen. As is well known by all readers of THE PAPER INDUSTRY, superheated steam is now used in a great many power plants. Very high temperatures are common—so high that brass fittings are sometimes ruined. In fact, we know that steam superheaters often get "red hot"—poor practice, of course, but, just the same, the superheaters don't explode.

Even if the steam superheater should burst while red hot, due to its reduced strength at high temperature, it is quite possible that there would be no violent explosion, especially if the boiler is a water tube boiler. Just the other night, for instance, I happened to be on a train on which the engine had "engine trouble," as they say. One of the flues blew out and, as a result, steam was blown into the fire box. Did the boiler explode? Did the steam burn? No. The net result was—the steam put the fire out.

The writer understands that where steam jets are used for creating drafts in boilers, the steam becomes so hot that disassociation takes place and that, later on, the oxygen and hydrogen reunite, the net result being—no loss so far as heat is concerned. This sounds reasonable, but it takes place without any explosion whatever. It is the writer's contention that if this steam jet were made large enough in volume, it would become so large that the heat in the furnace would be insufficient to break it up, and the fire would very likely be cooled down to the point where it would be extinguished.

Throw a thimbleful of water into a furnace and the effect will be almost unnoticeable. Throw a little more water into the furnace and there will be some noise. Possibly there will be a little semblance of an explosion due to the sudden generation of a small amount of steam, but the amount of steam generated will be insignificant.

So far as I know, there is no "after explosion" due to ignition and reuniting of the oxygen and hydrogen. The specific heat of coal, according to Mark's Handbook, is 0.314. If in a given furnace we have 100 lbs. of coal burning at a temperature of 2,500 degrees F., how much water will be required to cool that coal down to the temperature of steam at atmospheric pressure, or 212 degrees F.? It is an easy matter to figure that it will require only about a cubic foot of water. Besides, the temperature of the coal never averages as high as 2,500 degrees F., as is well known. The temperature of combustion sometimes reaches that point, but the fuel bed itself is comparatively cool. Therefore, the writer reasons that where small amounts of water are poured into the furnace the result is practically nil, and that where large quantities of water are poured into the furnace the fire is extinguished. In violent explosions, where rupture suddenly occurs in parts of a boiler exposed to the furnace, the fire is either extinguished or is blown out and scattered over the plant, sometimes resulting in burning down and destruction of the building.

The fact that water tube boiler explosions are seldom as violent as fire tube boiler explosions, is further proof that the old contention is wrong. It is just as likely that the steam or water from water tube boilers will come in contact with, and mingle with, the flame as in the case of fire tube boilers. In fact, there would be more danger from the water tube boiler, due to ignition of oxygen and hydrogen, if it were really a danger. In the case of a rupture of a tube in a fire tube boiler, the steam simply escapes and keeps the flame out of the tube; whereas in the water tube boiler, the steam is liable to come in continuous contact with the flame in a highly heated furnace, and yet nothing happens, the leakage being insufficient to extinguish the flame.

The reason why fire tube boiler explosions are more violent than water tube boiler explosions is well known, I believe. The principal reason is that the fire tube boiler contains a large mass of water. This mass suddenly generates steam as soon as pressure is relieved. The amount of steam generated is directly proportional to the mass. Therefore if the amount of water contained in a fire tube boiler is five times as great as the amount of water contained in a water tube boiler, the violence of the explosion may be five times as great, if it is possible to compare explosions in a numerical way.

Shaft Couplings and Their Value

SOMETIMES shafts break, hence it is well to be prepared and have a shaft coupling handy. To repair a broken belt is usually a simple matter compared with repairing a broken shaft. In the former case you merely need some lacing, wire, or cement. In the latter, it is difficult to devise a makeshift in a short time, hence the importance of having a coupling on hand. The cost of a broken shaft may mount up seriously; wages are wasted, deliveries delayed, and the reputation of the man in charge is endangered.

There are shaft couplings on the market that will easily mend an ordinary break in four or five minutes. These couplings are so made as to fit any shaft, and the union is made with throwing the ends out of alignment. They are also made without projecting screws; they look neat, and are amply strong. During a lull in operations, the shaft may be mended permanently, and the coupling removed in readiness for the possibility of future breaks.

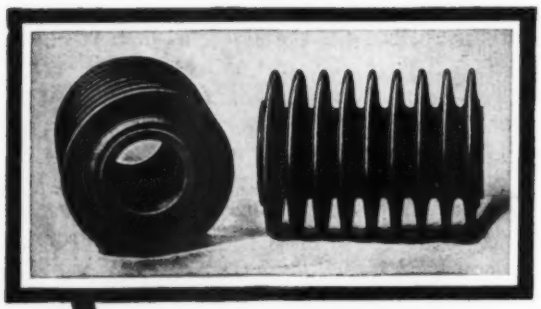
The Rings Make Them More Efficient—Compact—Durable

The cast-iron rings that char ·ize Foster Superheaters present to the furnace gases a far greater s· ·e than is obtained in any other type of superheater, thereby increasi· superheating effectiveness and enabling a smaller Foster Superheater · ·· the work that would require a much larger straight-tube superheater.

Their gre· mass (from 4 to 6 times that of a bare tube) als· ·rves as a heat reservoir to steady the superheati·g effect during fluctuations of heat supply or steam demand.

These rings furthermore assure maximum durability by protecting the steel superheater tubes from the corrosive action of the hot furnace gases.

This patented Foster Superheater construction has been demonstrating its advantages through 20 years of service and in 10,000 installations. We shall be glad to show you, without obligation, just how much Foster Superheaters can reduce your fuel costs and improve your plant operation. Write us your operating conditions.



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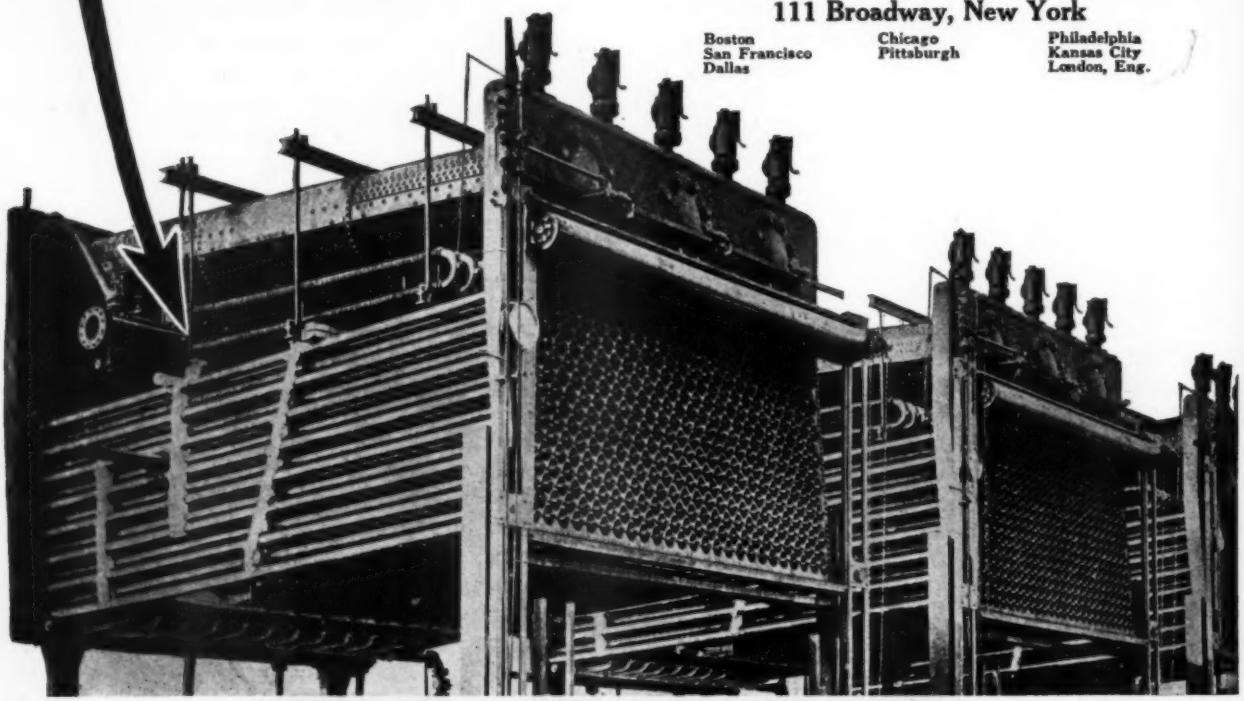


FOSTER SUPERHEATERS

A Train of Links

HAS IT ever occurred to you that a power plant is a "train of links"? For a moment let us dwell upon this thought, as it is seldom looked at in just this light.

In the first place, in a paper mill we [illegible] a pound of coal on the grates which must be co[illegible]ted into heat—into as much heat as possible. C[illegible]ustion is the "connecting link" in this case [illegible] brings about the transformation. If the comb[illegible]on is imperfect the connecting link is a poor one. Too much air, too little air, insufficient combustion space, etc., all tend to corrupt the combustion process.

Next comes the metal walls of the boiler shell and tubes. They are the "connecting links" between the hot gases and the water. It is the duty of the fireman to keep these walls clean both inside and out, in order that they may be as efficient as possible.

Next comes the pipe line connecting the boiler with the engine or turbine. It should be large enough and yet not too large. It should be well insulated so that heat losses will be minimized. The pipe line is a very important "connecting link."

Next comes the engine or turbine itself. It is the connecting link between heat energy and mechanical energy. Skillful design, accurate workmanship in the construction of the machine, proper valve setting, lubrication, careful maintenance, etc., all are very important to effect and maintain as high an efficiency as possible in this "link."

Then, where power is distributed solely through belts and pulleys, the belts, pulleys, and shafts are the connecting links up to the very machines themselves.

Where the power is distributed electrically we have other links—the conveying cables and wires, the motors, and lastly, in a great many cases, the final belt to the machine.

If the efficiency of every link is maintained at its highest point, the power end of the mill is beyond criticism. The overall efficiency will then be very high. But if the efficiency of every link is low or indifferent, the overall efficiency of the power end of the mill will be distressingly low.

Shafting Cleanliness

IT IS always highly desirable to keep things clean, especially in rooms where the product may become soiled if dirt is allowed to accumulate. It is, therefore, well to keep the shafting cleaned, and even polished. On account of the rotary motion of shafting and the resultant centrifugal force, dirt particles and oil are easily thrown off, the same as from pulleys. Such particles should never be permitted.

It is not difficult to keep shafting clean and polished after it is once in that condition. It can be done from the floor with ease, by means of a long-handled wiper or by means of a "compressed air duster." Never stand on a ladder while doing this kind of work. It is wasteful of time, dangerous, and unnecessary.

Steel I-Beam Chart

INASMUCH as I-beams are frequently used in and about paper mills for lifting heavy loads, and

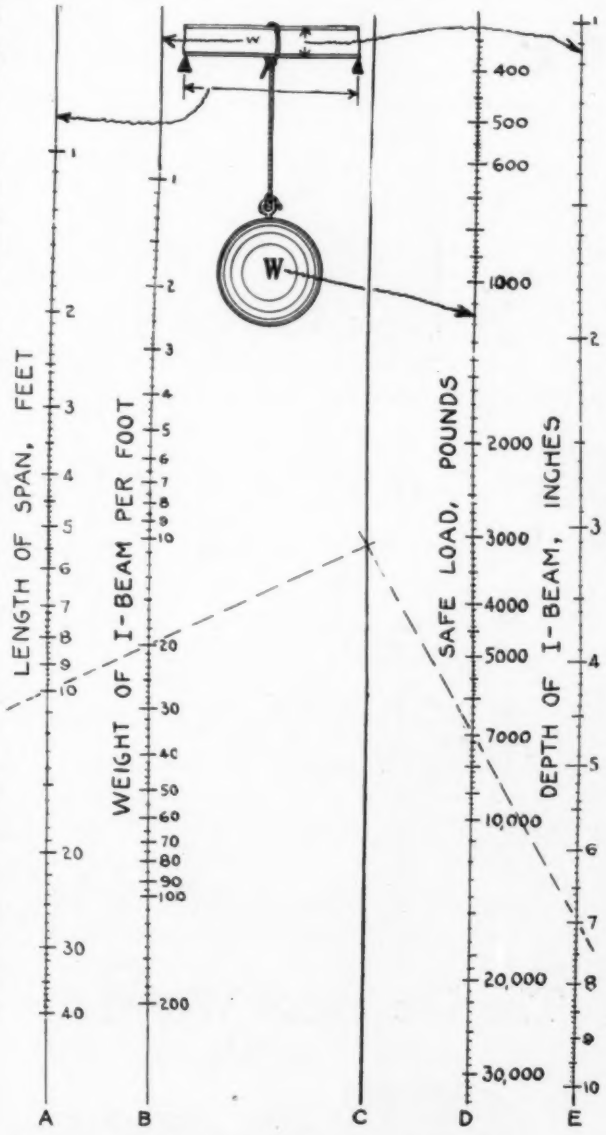
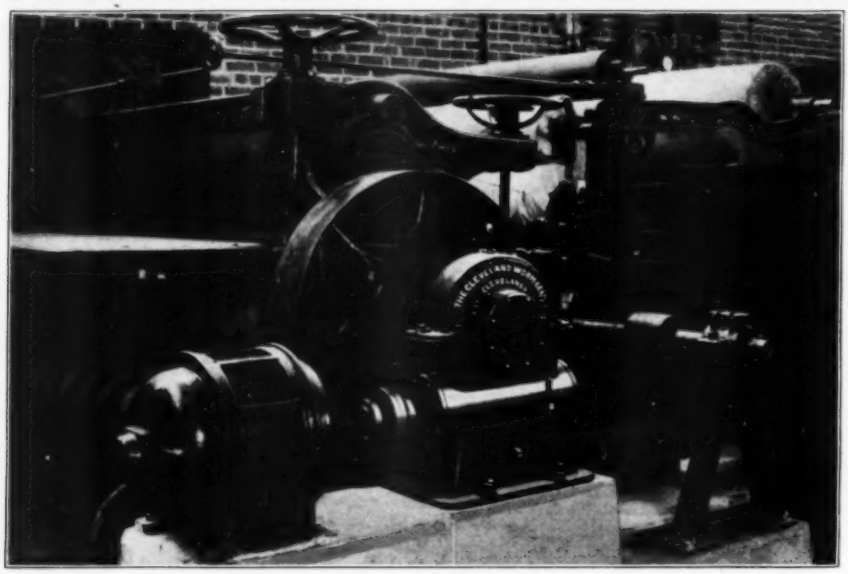


Chart for testing load capacity of I-beams

since they will certainly be used more and more (because the I-beam is the lightest and most economical steel beam for most purposes), I have prepared the accompanying chart, which will prove to be useful to paper mill engineers and mechanics. So far as I know, no similar chart for I-beams has ever before been prepared.

It is well known that a concentrated load, as shown in the sketch, represents the very worst con-



Cleveland Worm Gear Reduction Unit applied to ground wood press. Motor 10 H. P. at 1200 R. P. M. Reduction in worm drive 40 to 1.

Are you familiar with these worm gear advantages?

The advantages of Cleveland Worm Gear Speed Reduction Units should be known to every engineer. We repeat them below:

1. High efficiency.
2. Low cost of upkeep.
3. Smooth, even flow of torque.
4. Freedom from vibration.
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6. Ability to handle abnormal gear ratios with ease.
7. Positive lubrication.
8. Positive simplicity.
9. Maximum silence in operation.
10. Permits standardization of motor speeds.

Unusually large ratios may often be handled through Cleveland Worm Gear Reduction Units in one set of gears.

We recommend them on the basis of permanently satisfactory service. Our engineering department is always glad to co-operate with yours.

Don't settle your speed reduction problem until you have given due consideration to the facts listed above and then get in touch with us for further information.

Used in leading mills in connection with:

Plate and Rotary Screens, Knotters, Agitators, Pulpers, Fans, Conveyors (cordwood, coal, lime and ash), Pulp Machines, Boiler Feed Pumps, Thinning Tanks, Wet Machines, Bleach Boilers, Bucket Elevators, Rewinders, Save-alls, Suction Boxes, Presses, Calenders; also in connection with paper machines to take the reduction between prime movers and the lineshaft and the Fourdrinier, Conch, Dryers, Press and Calender sections.

The Cleveland Worm & Gear Co., Cleveland, Ohio

"America's Worm Gear Specialists"

Cleveland WORM GEAR REDUCTION UNITS

dition, requiring the largest beam for a given load. This chart is based upon concentrated loads, for the sake of safety.

The dotted arrow lines, running from the sketch to the vertical chart lines, show at a glance just what each chart column means. Thus Column A gives the length of the span in feet and includes all lengths up to 40 feet. Column B gives the weight of the I-beam in lbs. per foot, and includes all weights up to 200 lbs. Column D, giving the safe load of the I-beam in pounds, varies from 400 to 30,000 lbs. Column E gives the depths of beams in inches from 1 to 10 inches.

To show how the chart is used, suppose that a weight of 4,000 lbs. must be supported. A 7-inch I-beam, weighing 240 lbs., is available. It is 12 feet long, and therefore weighs 20 lbs. per foot. The minimum distance between supports that can be obtained for the lifting operation is 10 feet. Is the I-beam strong enough to lift the 4,000-lb. load?

The dotted lines drawn across the chart show how the problem is solved graphically. Run a straight line through the 10-ft. (Column A) and the 20-lb. (Column B) points and locate the intersection in Column C. Then, from the intersection in Column C, run over to the 7-in. (Column E). The intersection through Column D shows that the I-beam will support 7,000 lbs. Since the load to be lifted is only 4,000 lbs., the beam is amply strong. In fact, the reader can easily find, by applying the chart, that a 4-inch I-beam, all other conditions being the same, would safely support the load of 4,000 lbs.

Similarly, it is easy to ascertain the maximum allowable span when the factors in Columns B, D and E are known. Or, the necessary weight per foot of I-beam may be determined when the factors in Columns A, D and E are known. Lastly, the depth of beam is determinable when the factors in Columns A, B and D are known.

For loads that are "uniformly distributed"—not concentrated—the safe loads in Column D may be multiplied by two. Thus, the above described beam will support a uniformly distributed load of 14,000 lbs., or 14,000 lbs. per running foot.

Care of Leather Belts

IT IS not difficult to keep a leather belt in fit pulley condition. Much more work is required to put it in shape, repeatedly after allowing it to become dry and hard frequently. Proper belt management requires the **keeping** of the belt in its most efficient operating strength and vigor. Belts should be kept pliable with a smooth, elastic driving face. If allowed to become dry, they are liable to harden and crack and they will slip on their pulleys. The slip is bound to generate heat which often becomes so serious as to char or burn the belting.

Many of the prominent leather belt manufacturers make their own belt dressing and recommend treatments that may be at slight variance with one another. In the essential points they all agree, however, namely, that belts must be kept clean and pliable.

Leather belts that are not saturated with oil may be cleaned by soaking for about two hours in warm water and soda. It then is a simple matter to scrape off any dirt or grease that may be on the surface.

Avoid Belt Trains

SOMETIMES belt trains are made purposely, though mistakenly, being considered better than long single belts. The following, which actually appeared in print, makes it evident that users of belt drives do not always appreciate the great loss possible by the use of belt trains. In the instance cited below, a single belt drive which might easily have had an efficiency of 90 per cent, was cut up into a train of six drives so that the overall efficiency certainly was no greater than 74 per cent, assuming a unit efficiency of 95 per cent. This is arrived at by multiplying the efficiency of each drive by itself as many times as there are unit drives in the train. Thus where there are six drives in the train we get $0.95\times0.95\times0.95\times0.95\times0.95\times0.95=74$ per cent.

If the unit efficiency is only 90 per cent, the overall efficiency becomes 53 per cent, because $0.90\times0.90\times0.90\times0.90\times0.90\times0.90=53$ per cent.

The published statement to which I take exception says this:

"The power was carried from engine to point of use by 30-inch belts over wooden pulleys. It was found impracticable to use a single long belt to span the 300 feet over which power had to be transmitted. The attempt was made when the transmission was first installed, and a single long belt was put in, supported by idlers every 30 feet. Finally, the idlers were all taken out and countershafts placed every 50 feet, two pulleys on each shaft, and the long belt was cut up and laced over the several pulleys on the counters."

Mere Matter of Detail?

IN DISCUSSING efficiency with a friend not long ago, the friend remarked, "Efficiency is a mere matter of detail." That sounds simple enough and might be regarded by some as a conclusive definition of efficiency. But it must be borne in mind that detail is not a "mere matter." Thomas Edison is reported as having said that big ideas always come easily, but in working out the details it is "plug, plug, plug." Even a mind as remarkable as that possessed by the late Dr. Steinmetz found it necessary to spend more time working out details than in originating ideas.

KERR BLEEDER TURBINES
— FOR —
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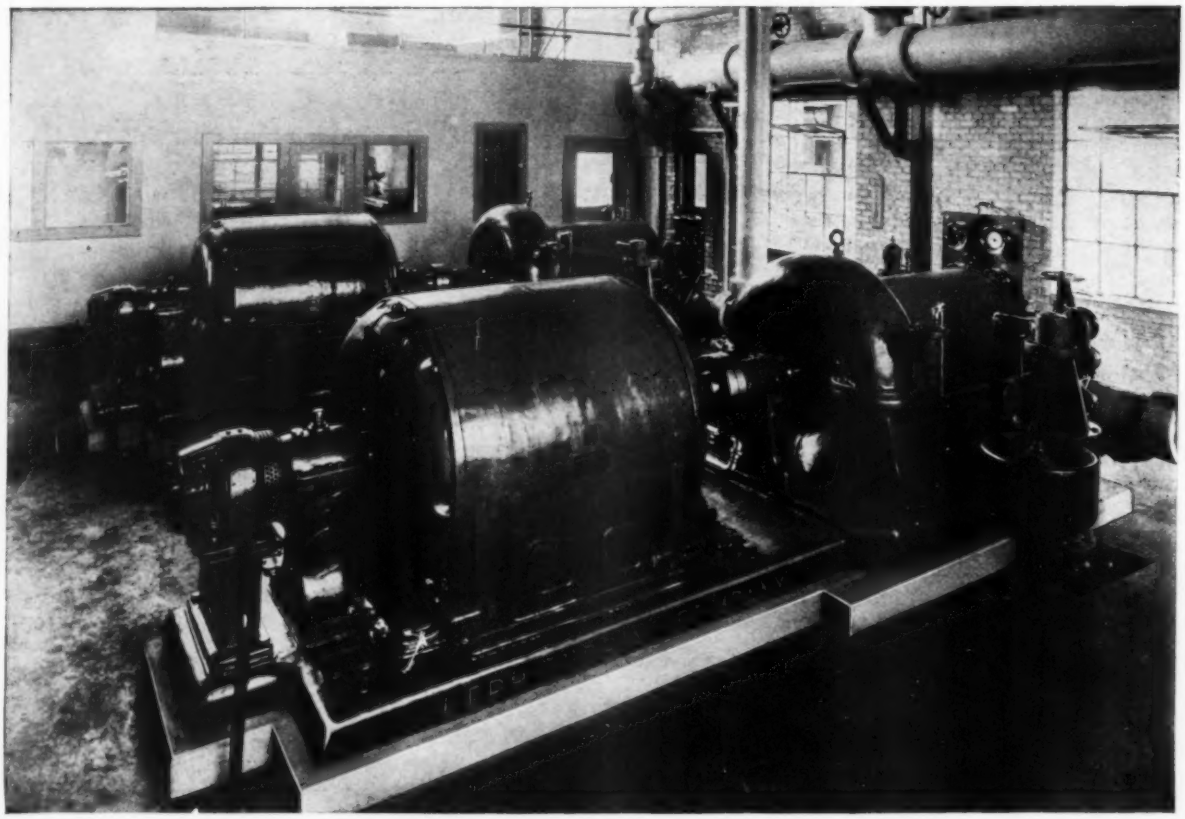


TWO 750 K. W. KERR BLEEDER TURBINE-GENERATORS
AMERICAN SEATING CO., GRAND RAPIDS, MICH.

TO SECURE highest economy in the operation of an industrial plant requiring low pressure steam for heating or process work, it is necessary to use commercially the maximum number of heat units generated. This can best be accomplished by the installation of a properly designed Kerr Bleeder Turbine which will automatically maintain a perfect heat balance.

The Kerr Turbine Company has in successful operation a large number of turbines designed to bleed steam at one specified pressure; and has just recently built for a large paper mill a 1000 K. W. unit which will automatically bleed at two different pressures.

KERR STEAM TURBINES-REDUCTION GEARS
KERR TURBINE COMPANY
WELLSVILLE, NEW YORK U·S·A·

DISTRICT OFFICES IN ALL LARGE CITIES

The Great Power Show

BY W. F. SCHAPHORST, M. E.

AS I write this, the Second National Power and Mechanical Engineering Exposition in Grand Central Palace, New York City, has just started its fourth day.

It is a big show—twice as large as the first show which was held in the same place last year.

It is a successful show. All exhibitors are enthusiastic about it, and so are the visitors.

To properly report the show for THE PAPER INDUSTRY, I felt that it way my duty to call at every booth, which I did, and I found that to be no small task. Calling at every booth consumed the first three entire days of the show, the doors opening at 12 noon and closing at 10:30 P. M. That fact, coupled with the report below, will probably give the reader an idea as to the size and importance of such a show as this.

Last year the exposition occupied one floor in Grand Central Palace. This year two floors are completely filled, and I am told that next year they are going to use three floors. The three floors will be filled with enthusiastic exhibitors, is my prediction.

In order to make as complete a report as possible to readers of THE PAPER INDUSTRY, I combed everything over pretty well and I have arranged the exhibits alphabetically below. To write up everything would require every page in this issue. I must be terse.

To save space I have used the word (New) at the left of paragraphs describing "something new." Thus should any reader wish to know only about the "new" things in the power field he can read those paragraphs marked (New) and skip the rest.

The paper industry, I find, plays a very prominent part in the power field. Many exhibitors informed me of instances where paper mills were quicker at appreciating the value of economizing devices than were the large central power stations. A number of them said, "We got our start in the paper field." In fact, so much power equipment is used in paper mills that there are very few booths that do not interest paper mill executives who visit the show.

A number of exhibitors are displaying so many things, that it is impossible to adequately describe their booths. The Walworth Mfg. Co., Boston, Mass., for example, have a very large exhibit of hundreds of articles. I was informed that they make 23,000 different products.

Just as in the Paper Show, held in New York City early this year, the principal thought in evidence everywhere is **Economy**. Every manufacturer strives to produce something that will **Reduce Costs** or make things better or safer. Higher quality and safety are both very closely related to economy in most instances, so we can practically boil the whole thing down to that one important word—**Economy**.

My alphabetical report of the exposition, which I trust will prove to be of some value to readers of THE PAPER INDUSTRY, is as follows:

(New)—Air Preheaters.

A model was on display by James Howden & Co., of Wellsville, N. Y. Some are already installed in paper mills. See back issues of THE PAPER INDUSTRY regarding economy of Air Preheaters.

Asbestos Products.

Keasbey & Mattison, Ambler, Pa., gave a temperature demonstration with actual steam showing why pipes should be covered.

Ash Conveyors.

Girtanner Engineering Corp., New York, N. Y.
Victor Engineering Co., Inc., Philadelphia, Pa.

Ash Equipment.

Gillis & Geohegan, New York, N. Y., demonstrated full size ash removal equipment.

(New)—Ash Hoppers and Gates.

This is a comparatively new departure in engineering, consequently all of the following aroused much interest amongst the visiting engineers.

Allen Sherman Hoff Co., Philadelphia, Pa. Ash Hoppers and Grates and Linings.

The Baker Dunbar Co., Cleveland, Ohio. Ash gates and hoppers, air, steam or water.

Beaumont Mfg. Co., Philadelphia, Pa. Ash Hoppers and Gates.

Balanced Draft.

The Engineering Co., New York, N. Y.

Baffle Walls.

The Engineering Co., New York, N. Y.

Ball Bearings.

An interesting demonstration of "bouncing steel balls" was the feature of the New Departure Mfg. Co. booth of Bristol, Conn.

The Fafnit Bearing Co., New Britain, Conn.

The Gurney Ball Bearing Co., Jamestown, N. Y.

Norma Company of America, Long Island City, N. Y.

S. K. F. Industries, New York, N. Y., exhibited a wabbling shaft and a large shaft with pulleys that did NOT wabble.

Bearings.

Hill Clutch Co., Cleveland, Ohio.

Belt Fasteners.

(New)—Detroit Belt Lacer Co., showed us how to cut and lace belts. They have a new cutter for cutting belts "square" up to 10 inches.

Flexible Steel Lacing Co., Chicago, Ill.

W. O. & N. W. Talcott, Inc., Providence, R. I.

Belting.

Garton & Knight Co., Worcester, Mass., ingeniously demonstrated all kinds of leather belt drives.

Leather belt operating in water. Laurence Belting Co., New York, N. Y.

The Leather Belting Exchange, Philadelphia, Pa., showed how to make leather belts endless. They also demonstrated a leather belt operating in water. Their very interesting belt transmission testing machine attracted a great deal of attention.

Belts, Conveyor.

(New)—Sandvik Steel, Inc., New York, N. Y., demonstrated a one-tenth size steel conveyor belt handling very fine coal on a 14 deg. incline and discharging at two points.

Blowers.

Carling Turbine Blower Co., Worcester, Mass.

Coppus Engineering & Equipment Co., Worcester & Equipment Co., Worcester, Mass.

L. J. Wing Mfg. Co., New York, N. Y.

Boiler Alarm.

Williams Gauge Co., Pittsburgh, Pa.

Boiler Feed Regulator.

(New)—A regulating valve movement indicator was exhibited by the Northern Equipment Co., Erie, Pa., attached to the Copes Regulator. It shows what that valve is doing at all times. Can be placed almost anywhere.

S. C. Regulator Co., Fostoria, Ohio.

Williams Gauge Co., Pittsburgh, Pa.

Boiler Furnace Arches.

American Arch Co., New York, N. Y., demonstrated a full size arch.

The Liptak Fire-Brick Arch Co., Chicago, Ill., exhibited their "double suspension arch" which is virtually an "indefinite life arch." Very interesting and important.

McLeod & Henry Co., flat suspension furnace arch.

Boiler Furnace Walls.

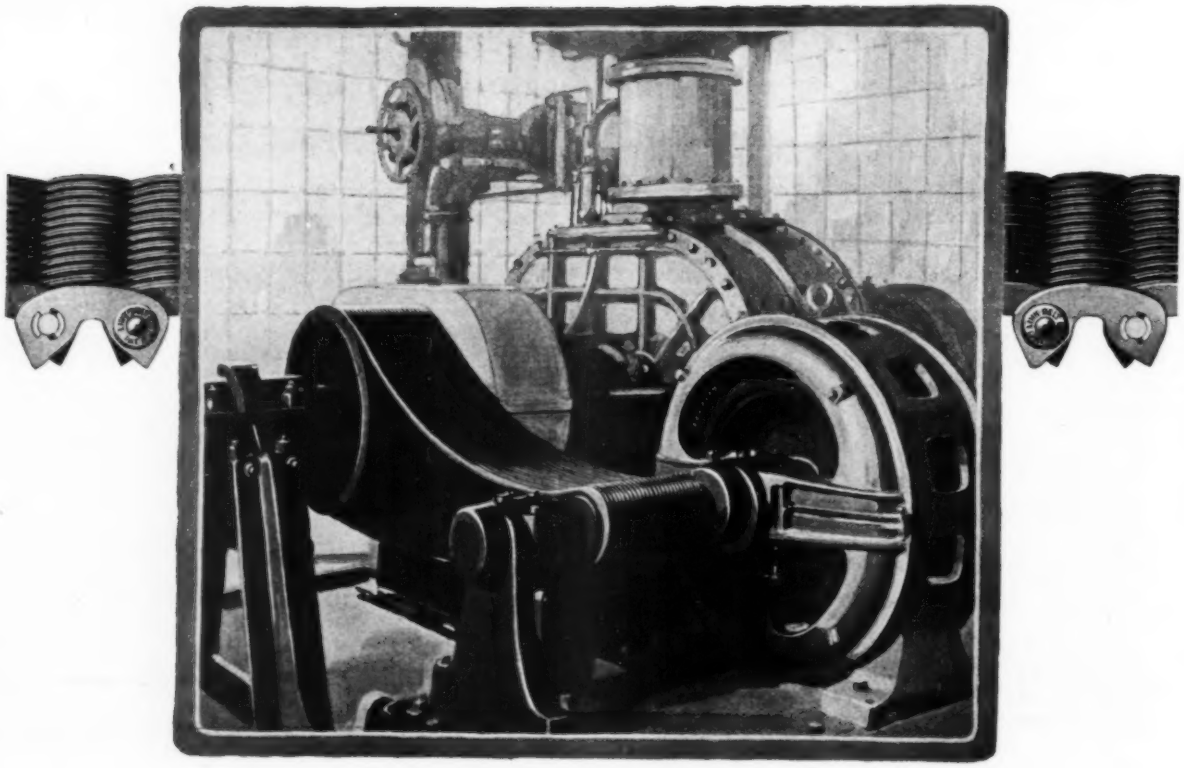
A "clinker proof wall" was shown by the Bernitz Furnace Appliance Co., Boston, Mass. A number of them are already installed in paper mills.

Drake Non-Clinkering Furnace Block Co., New York City.

Geo. Allen & Son, New York, N. Y.

(New)—The Liptak Fire-Brick Arch Co., of Chicago showed their new Interlocking Fire Brick Wall—a very important advance in boiler furnace engineering.

Waite & Davey Co., Inc., Long Island City, N. Y. Air Cooled Refractories and Air Cooled Furnace Walls.



You can do much to inform yourself on elevating, conveying and power transmission methods and equipment by reading these books. Sent gratis on request.

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DON'T waste power—

Drive your machine and line-shafting with this 98.2% efficient Link-Belt Silent Chain Drive.

It is flexible as a belt—positive as a gear—more efficient than either.

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SILENT CHAIN DRIVES

Boiler Hand Hole Caps.
Key Boiler Equipment Co., East St. Louis, Ill.

Boiler Leaks.
"X" Laboratories, New York, N. Y., told how to prevent leaks in high pressure boilers.

Boilers, Steam.
The Bigelow Co., New Haven, Conn., demonstrated an interesting gas heated glass front boiler. The entire operation of the boiler was distinctly visible.
Geo. T. Ladd Co., Pittsburgh, Pa.
Springfield Boiler Co., showed Header Baffle Nozzle.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

Brass & Copper Goods.
American Brass Co.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Metal Works, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Wheeler Condenser & Eng. Co., Carteret, N. J.

Brick, Fire.
A. P. Green Fire Brick Co., New York, N. Y.

Brick, Insulating.
(New)—A new brick known as Key-Cel-Brix was exhibited by the Keystone Refractories Co., New York, N. Y. It has a number of excellent talking points.
The Celite Products Co., New York, N. Y., had an interesting exhibit. This writer did not know before that SIL-O-CEL is a natural product. It is strong and heat resisting. The heat transmission is but one-tenth as great as that of fire brick.

CO_2 and CO Apparatus.
(New)—CO. An interesting and valuable "Combustible Recorder" was demonstrated by the Uehling Instrument Co. of Paterson, N. J. Mr. Uehling moistened a small piece of cotton with some alcohol (Don't know where he got the alcohol) and held it close to an orifice. The red indicator instantly began to climb. It is claimed that it will indicate any combustible. A very valuable addition to the CO_2 machine indeed.
(New)—CO_2 Apparatus.—Bacharach Indust. Inst. Co., Pittsburgh, demonstrated an electrical CO_2 outfit. Large, easily read gauges may be placed at any distance from the boilers. Six boilers may be read on one chart. The lag is very small.
Cambridge & Paul Instrument Co. of America, Ossining, N. Y. Electrical CO_2 and CO Recorders.
CO_2—Paul B. Huyette, Philadelphia, Penn.
CO.—Republic Flow Meters Co., Chicago, Ill.
C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. Recorders CO & CO_2.

Chain Drive.
A silent chain drive was demonstrated by the Boston Gear Works, Quincy, Mass.

Clutches.
Hill Clutch Co., Cleveland, Ohio, showed a large Hill Clutch.

(New)—Coolers.
A generator air cooler was demonstrated by the Griscom Russell Co., New York City.

(New)—Cutless Bearing.
A grit proof, cutless bearing was exhibited by the B. F. Goodrich Rubber Co., Akron, Ohio.

Damper Regulators.
A. W. Cash Co., Decatur, Ill.
Julian D'Este Co., Boston, Mass.
Locke Regulator Co., Salem, Mass.
Mason Regulator Co., Boston, Mass.
National Regulator Co., 208 S. Jefferson St., Chicago, Ill.
Paul B. Huyette, Philadelphia, Penn.
Stewart-Sayers Co., New York City.

Deaerators.
A device for removing air from boiler feed was displayed by the Elliott Co., Pittsburgh, Penn.

Economizers.
Power Specialty Co., New York City.

Elevators and Escalators.
Otis Elevator Co., New York City.

Engine Stops.
Locke Regulator Co., Salem, Mass.

Evaporators.
Griscom Russell Co., New York City.

Expansion Joints.
Alberger Heater Co., Buffalo, N. Y.

Filters.
Streamline Filter Corp., New York City.

Filters, Water.
Graver Corporation.

Fittings.
The Continental Valve & Equipment Co., Chicago, Ill., showed a line of high temperature and high pressure fittings. Good around digestors.

Flexible Couplings.
Brown Engineering Co., Reading, Penn.
Falk Corporation, Milwaukee, Wis.
Smith & Serrell, Newark, N. J.

Gaskets.
Goetze Gasket & Packing Co., N. Brunswick, N. J.
John R. Robinson, 110 W. 34th St., New York City.
Klingerit, Inc., 16 Hudson St., New York City.
Metallo Gasket Co., New York City.

Gauge Glasses.
(New)—An inclined gauge which is easier to see from the boiler room floor for three reasons was demonstrated by Ernest & Co., of Newark, N. J.
(New)—Klingerit, Inc., New York City, exhibited a very interesting fluted "reflex gauge glass" for high pressures. In it the water level shows very distinctly.

Gauge Illuminator.
(New)—National Co., Boston, Mass., showed us how to illuminate gauge glasses.

Gauges.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Ashton Valve Co., Cambridge, Mass.
Bacharach Industrial Inst. Co., Pittsburgh, Penn.
Bristol Co., The, Waterbury, Conn.
Crossby Steam Gage & Valve Co., Boston, Mass.
Foxboro Co., Inc., Foxboro, Mass.
Lewis M. Ellison, Chicago, Ill. Draft Gauges.
Manning, Maxwell & Moore, Inc., New York City.
Nelson Mfg. Co., Philadelphia, Penn.
Paul B. Huyette Co., Philadelphia, Penn.

Gauge Testers.
Crosby Steam Gage & Valve Co., Boston, Mass.

Gears.
Boston Gear Works, Quincy, Mass.
The Falk Corp., Milwaukee, Wis.
Philadelphia Gear Wks., Philadelphia, Penn.

Grates.
Marion Machine, Foundry & Supply Co., Marion, Ind.
Pyramid Iron Products Corp., New York City, exhibited a grate for burning small anthracite or lignite coal.

Grease Extractors.
The Blackburn-Smith Corp., 103 Parks Ave., New York City.
Griscom Russell Co., New York City.
James T. Gordon Co., New York City.

Heaters, Feed Water.
Alberger Heater Co., Buffalo, N. Y.
Standard Water Systems Co., Hampton, N. J.
Warren Webster & Co., Camden, N. J.

Lamp Guards.
Flexible Steel Lacing Co., Chicago, Ill.

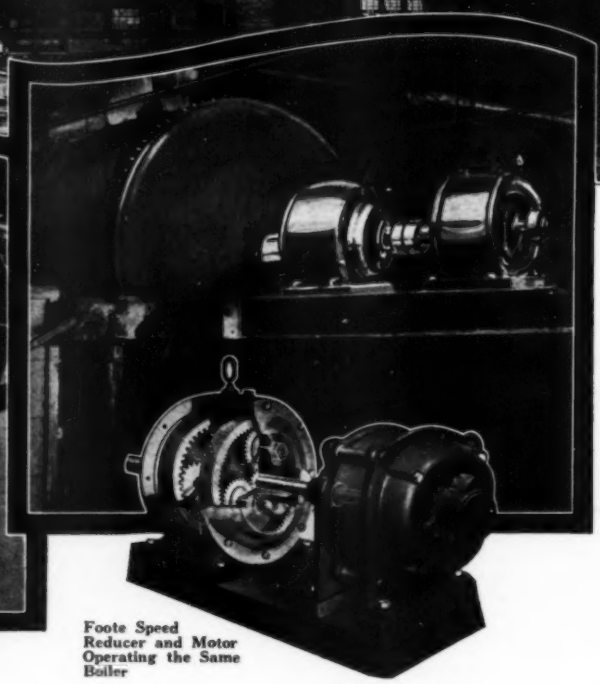
Lead Lining.
Lead Lined Iron Pipe Co., Wakefield, Mass.

Liquid Level Gauges.
Foxboro Co., Foxboro, Mass.

Lubricants.
Keystone Lubricating Co., Philadelphia, Pa.
Tide Water Oil Sales Co., New York, N. Y.

Lubricators.
Bassick Mfg. Co., Chicago, Ill., demonstrated its high

A Rotary Boiler, Containing Waste Paper Stock, Operated Through Series of Gears



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Your Equipment Needs This

Wherever a reduction in motor speed of 3 to 1 or more is necessary Foote Speed Reducers will do the work at a saving in installation cost, operation cost, maintenance cost, replacement cost, and power cost.

Foote Speed Reducers replace open equipment such as belts, chains, ropes, open gearing, etc. Because they are entirely enclosed with all moving parts running in oil, they deliver from 86 to 94% of the motor power, provide positive safety to workers, and give uninterrupted service.

They are ideal for use on storage tanks, mixers, conveyors, and other paper mill equipment.

Tell us about your equipment and let our engineers show you why you need Foote Speed Reducers.

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J. R. Shays, Jr., 100 Grennwich St., New York City
King & Knight, Underwood Bldg., San Francisco, Calif.

pressure lubricating system for paper rolls, conveyors, hoists, etc.

Keystone Lubricating Co., Philadelphia, Pa., demonstrated their system of "distributed lubrication." Also conducted a "strong man contest."

Materials Handling Machinery.

An elaborate demonstration of coal and ash handling equipment was staged in the booth of the Beaumont Mfg. Co., Philadelphia, Pa. They showed a coal weighing larry which weighs coal as rapidly as consumed. They also gave a skip hoist demonstration using real, full size coal.

Gifford-Wood Co., Hudson, N. Y.

Jeffery Mfg. Co., Columbus, Ohio.

Meters.

The Bailey Meter Co., Cleveland, Ohio, had a very interesting exhibit showing water flowing through pipes made entirely of glass. This exhibit alone was worth the price of admission.

(New)—A flow meter new to this country was demonstrated by Paul B. Huyette, Philadelphia, Pa. 12,000 are in use in Europe. Based on Hallwach's patents. Made in France.

H. S. B. W. Cochrane Corp., Philadelphia, Pa. V-Notch water meters.

The Lea "V" Notch Water meter was demonstrated by the Yarnall Waring Co., Philadelphia, Pa.

The Republic Flow Meters Co., Chicago, Ill., showed a draft indicator, draft recorder, and differential draft recorder. They had 12 steam flow meters in actual operation, connected to a single meter board showing how the operation of 12 boilers can be observed at one central point. A very instructive exhibit.

The Simplex Valve & Meter Co., of Philadelphia, demonstrated a hot water meter with indicating, recording and intergrating mechanism.

Monel Metals.

International Nickel Co., New York, N. Y. Beautiful exhibit.

(New)—Oil Burners.

Much progress has been made in oil burners in recent years and I believe all of the following contained improvements:

Bethlehem Ship Building Corp., New York City.

The Coen Co., San Francisco, Calif.

Dempsey Furnace Co., 61 Cornelison Ave., Jersey City, N. J.

The Engineer Co., New York City.

International Combustion Engineering Corp., New York City.

Peabody Engineering Corp., 110 E. 42nd St., New York City.

W. N. Best Corp., New York City, gave an oil burner demonstration, using water instead of oil.

Packing.

France Metallic Packing Co., Philadelphia, Penn.

(New)—Klingerit, Inc., New York City showed a new "semi-metallic" stuffing box packing. It is made of asbestos, flat metal, and is lubricated with graphite.

Pipe.

Genuine wrought iron pipe was displayed by the Reading Iron Co., Reading, Penn.

Lead Lined Iron Pipe Co., Wakefield, Mass.

Pipe Bending & Fitting.

Ballwood Co., New York City.

Crane Company, Chicago, Ill.

Pittsburgh Valve Foundry & Construction Co., Pittsburgh, Pa.

Power Transmitting Machinery.

Reeves variable speed transmission was demonstrated with electrical remote control by Manning, Maxwell & Moore Co., New York City.

The A. & F. Brown Co., New York City, exhibited a large line of pulleys, gears, shafting, hangers, etc.

R. & J. Dick Co., Inc., New York City, N. Y.

The Fafnir Bearing Co., N. Britain, Conn.

Hill Clutch Co., Cleveland, Ohio.

Pulverized Fuel Burner.

International Cumbustion Engineering Corp., N. Y. City.

Pulverizers.

Aero Pulverizer Co., New York City.

The Erie City Iron Wks., New York City.

Fuller-Lehigh Co., Fullerton, Penn.

Jeffrey Mfg. Co., Columbus, Ohio.

Pennsylvania Crusher Co., Philadelphia, Penn.

Sturtevant Mill Co., Boston, Mass.

Pump Governors.

(New)—A pump governor containing no diaphragm and no pilot valve was displayed by the Continental Valve & Equipment Co., of Chicago, Ill.

The Fisher Governor Co., Marshalltown, Iowa.

Pumps.

The Nash Engineering Co., S. Norwalk, Conn., exhibited and demonstrated a line of pumps for many purposes. Their pumps are used in many paper mills.

Coppus Engineering & Equipment Co., Worcester, Mass.

M. T. Davidson Co., New York City.

James T. Gordon Co., New York City.

Union Steam Pump Sales Co., New York City.

Pyrometers.

(New)—Bacharach Industrial Inst. Co., Pittsburgh, Pa., displayed a pyrometer for taking flue gas temperatures which responds instantaneously.

Recording Instruments.

The Bristol Co., Waterbury, Conn.

Foxboro Co., Foxboro, Mass.

Refractory Materials.

Jointless Fire Brick Co., Chicago, Ill.

(New)—An excellent high temperature bonding mortar was demonstrated by the Keystone Refractories Co., New York City. Capable of withstanding over 3,000 deg. F. Their slogan is "It sticks to the bricks."

King Refractories Co., Buffalo, N. Y.

Mack Engineering & Supply Co., New York, N. Y. Refractory Engineers.

Maphite Corp., Chicago, Ill.

The S. Obermayer Co., Chicago, Ill.

Quigley Furnace Specialties Co., New York, N. Y.

Safety Latch.

(New)—D. E. Waters Safety Latch Co., New York, N. Y., showed a "safety latch" for furnace doors. Good in case of tube rupture, gas explosion, or back draughts.

Scale Removers.

(New)—The Roto Company, Hartford, Conn., exhibited a hose coupling which has no threads or no rivets. Also an operating valve at the end of a hose. Locks open or shut. Very convenient. Also a synchronized head which concentrates effort on scale and does not touch the tube. Claimed to save tubes, saves cutters, and speeds cleaning. Decidedly ingenious.

Elliot Co., Pittsburgh, Pa.

Scale Treatment.

Dearborn Chemical Co., New York, N. Y.

Seminole Chemical Co., New York City. Used by a number of paper mills for boiler scale and oil treatment.

Scientific Instruments.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

Soot Blowers.

Diamond Power Specialty Co., Detroit, Mich., showed "full floating head" blower. No right angle bends.

Marion Machine Foundry & Supply Co., Marion, Ind.

(New)—Vulcan Soot Blower Co., Du Bois, Pa., demonstrated a soot cleaner valve that does not "over ride" so that valve is not left slightly open when cleaner is not in use. One-piece non-ferrous alloy element capable of withstanding up to 2,000 deg. F. Brick wall can expand without disturbing soot cleaner elements.

Steam Specialties.

H. S. B. W. Cochrane Corp., Philadelphia, Pa.

Stiffeners.

Connery & Co., Philadelphia, Pa., exhibited their expansion stiffeners for flues and uptakes. Eliminates buckling, warping, and collapsing.

Stokers.

Cokal Stoker Corp., Chicago, Ill. Demonstrated Hopper feed hand operated stoker.

The Detroit Stoker Co., Detroit, Mich., had a "full sized" demonstration of their underfeed stoker.

(New)—The Huber Stoker Co., gave a "full size" demonstration which caused Warren O. Rodgers, Editor of Southern Engineer to remark to the writer, "That exhibit

ALLIS-CHALMERS

and

EDGE MOOR

Ten Edge Moor Boilers totaling 6643 H. P. in the Allis-Chalmers plant at West Allis, near Milwaukee, Wis.

THE Allis-Chalmers Manufacturing Company, one of the best-known makers of machinery and electrical equipment "complete from prime mover to switchboard," is a thoroughly competent judge of all power plant equipment.

Installed with Allis-Chalmers products, in the Company's large plant at Milwaukee, are eleven Edge Moor Boilers, furnishing the steam for the manufacture of other Allis-Chalmers equipment.

Purchased over a period of eighteen years, these eleven boilers represent five separate orders. The efficient performance of the first Edge Moors was responsible for subsequent orders.

In scores of industries, users of power, large and small, find in the Edge Moor Boiler the solution of their steam generation problems. Complete information is given in the Edge Moor Catalogue, a copy of which will be promptly sent at your request.

EDGE MOOR IRON COMPANY
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EDGE MOOR, DELAWARE

New York *Chicago*
St. Paul *Boston*
Pittsburgh *Charlotte*

EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY

is well worth seeing." Hydraulically operated without loss.

International Combustion Engineering Corp., New York City. Full size stoker demonstration.

Marion Machine Foundry & Supply Co., Marion, Ind.

Perfection Grate & Supply Co., Springfield, Mass. Hand stoker. A modern device for burning fuel economically.

Sanford Riley Stoker Co., Worcester, Mass. Full size demonstration.

United Machinery Mfg. Co., Canton, Ohio. Harrington stoker. Full size demonstration.

Strainers, Water.

Blackburn-Smith Corp., New York City.
The Elliott Co., Pittsburgh, Pa.
James T. Gordon Co., New York City.

Superheaters.

Power Specialty Co., New York City.
The Superheater Co., New York City, exhibited a nickel-plated superheater.

Tachometers.

Foxboro Co., Foxboro, Mass.

Temperature Regulators.

Foxboro Co., Foxboro, Mass.
Fulton Co., New York, N. Y.
Sarco Co., New York City.

Testing Instruments.

Ashton Valve Co., Cambridge, Mass.

Thermometers.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Foxboro, Mass.
C. J. Tagliabue, Brooklyn, N. Y.

Traps, Return.

Russel B. Hobson, New Brighton, Staten Island, New York, showed drawings of a gravity return system that eliminates the trap under certain conditions.

S. C. Regulator Co., Fostoria, Ohio, exhibited a condensation control and disposal for use on paper drying machines.

Sterling Engineering Mfg. Co., Hyde Park, Mass.
Warren Webster Co., Camden, N. J.

Traps, Steam.

Armstrong Machine Works, Three Rivers, Mich.
Bundy Steam Trap Co., Nashua, N. H.
Julian D'Este Co., Boston, Mass.
The Fisher Governor Co., Marshalltown, Ia.
James Gordon Co., New York, N. Y.
Sarco Co., New York City.
Valve Engineering Co., Cambridge, Mass.
Yarnall Waring Co., Philadelphia, Pa.

Trucks.

A truck that will carry and lift 4,000 lbs., some already used by paper mills was shown by the Baker R. & L. New York Corp., New York City.

Valves.

(New)—A unique quarter turn valve with self-contained lubricator was demonstrated by the Merrill Co., New York City.

A blow-off valve was shown by the Crosby Steam Gage & Valve Co., Boston, Mass.

A "straight through valve" was exhibited by the Everlasting Valve Co., Jersey City, N. J.

(New)—Techno-Service Corp., New York City, demonstrated an excellent valve that permits a straight flow of steam. It may be reground without removal from the line. Already installed in several paper mills.

(New)—The Julian D'Este exhibited a reducing valve with a renewable seat and valve.

(New)—Klingerit, Inc., New York City, demonstrated a "piston slide valve" which has numerous good talking points.

A non-return valve, by the Elliott Co., Pittsburgh, Pa.

A safety valve for 1,500 lb. pressure was exhibited by Manning, Maxwell & Moore Co., New York City.

(New)—Valves, Electrically Operated.

Payne Dean Limited, Stamford, Conn., showed how to control water, steam, or air valves from any distance, electrically. Excellent for important valves. Dean control was exhibited on valves in a number of the booths.

(New)—A reducing valve containing no diaphragm and no pilot valves was demonstrated by the Continental Valve & Equipment Co., Chicago, Ill.

(New)—A vertical non-return valve was shown by the Edward Valve & Mfg. Co., E. Chicago, Ind. Used, for example, on superheaters. May be remotely controlled.

Ashton Valve Co., Cambridge, Mass.
Crane Co., Chicago, Ill.
Foster Engineering Co., Newark, N. J.
A. W. Cash Co., Decatur, Ill. Reducing Valves.
Nelson Mfg. Co., Philadelphia, Pa.
Reading Steel Casting Co., Reading, Pa.
Henry Vogt Machine Co., Louisville, Ky.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Homestead Valve Mfg. Co., Homestead, Pa.
Jenkins Bros., New York City.
Lunkenheimer Co., Cincinnati, Ohio.
Yarnall Waring Co., Philadelphia, Pa. Blow-off Valve.

Valve Testing Apparatus.

Warren Webster & Co., Camden, N. J.

(New)—Water Level Indicator.

Something new in water level indicators was exhibited by the Northern Equipment Co., Erie, Pa. It can be placed anywhere below the boiler water level and indicated the level accurately.

Water Softeners.

Graver Corp., E. Chicago, Ind.

The Permutit Co., New York City, displayed one of their water purification systems.

Wayne Tank & Pump Co., Fort Wayne, Ind.

Water Treatment.

W. B. McVicker Co., Brooklyn, told us that they analyze water and diagnose boiler troubles. They give individual service to steam users.

Weighers.

The Merrick Scale Mfg. Co., Passaic, N. J., displayed a "Weightometer" that is installed in some paper mills for weighing chips and bundles of sulphite laps.

A small model was demonstrated by the Richardson Scale Co., Passaic, N. J.

Steam Turbine Application in Pulp and Paper Mills*

BY A. J. DARLING

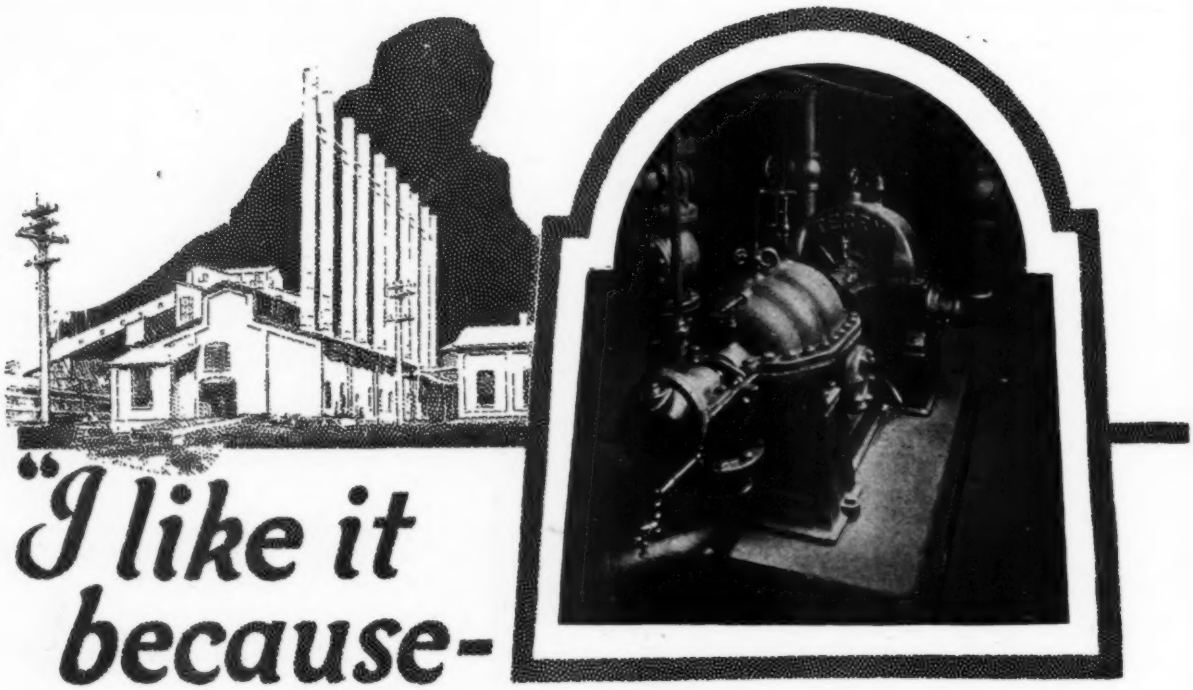
The General Electric Company

THE particular phase of interest today is in the application of steam turbo-generators to your mills. Each mill has its own problems varying widely from other mills in many cases, while in some the conditions are the same but the results desired differ from each other. What has been done to obtain maximum economy at minimum cost is probably of greater interest as general statements than the review of particular cases. With general principles in mind, specific instances can more readily be solved.

Steam is the most useful form of heat that has been tried in paper mills. Its peculiar characteristics deserve attention; for instance, it takes one heat unit to raise a pound of water 1°F. It takes .3 of a unit to raise a pound of steam from 212°F. to 213°F. at about atmospheric pressure. On the other hand, it takes 972 units at atmospheric pressure to change water into steam, while at 3,200 pounds pressure or 706°F. any additional heat changes water into steam. This point is called the critical pressure. Conversely in changing steam back to water near atmospheric pressure, a large amount of heat is made available and is used in a great many processes which require large amounts of heat to complete them. However, if condensation does not take place in the processes but only steam or water gives up its heat, the amount of steam or water must be enormously increased. On this point drying systems of paper machines prove successful or fail. Condensation can be used in a process but not in a steam engine; therefore, the dividing point in the use of hot water or steam determines the application of the energy released. For certain processes, temperatures higher than that of the boiling point of water are required, necessitating the use of an increased pressure, because it is not so much the additional heat that can be released as the penetration caused by the pressure upon the process involved. The example that bears this out is the cooking of chips.

The processes of the paper industry generally require pressures of relatively low order; for example, heating of build-

*Presented at the Fall Meeting of the New York Division of Superintendents, Carthage, N. Y., November 17, 1923.



"I like it because-

there are almost no working parts to get out of order. It has a solid wheel—no blading to break and cause damage to the nozzle and the casing.

THIS is from a report received from Mr. Robert Bostwick at the Old Forge Colliery, Moosic, Pa., of the Pennsylvania Coal Co. He is referring to the Terry boiler feed unit pictured above which, for the past five years, has been furnishing the hot feed water to a 2800 H.P. boiler plant. In commenting further on the installation he mentions the advantages over the plunger pump equipment previously installed. "No packing—uses very little oil—less steam—no more pulsation on the feed line which caused them to leak." For these very reasons Terry boiler feed units are daily replacing reciprocating units even in sizes which have been considered in the past as not belonging in the turbine class; namely, for boiler capacities of less than 1000 H.P. Because of their freedom from operating troubles, and their ability to maintain a high average efficiency through a period of years, they make a better investment than the reciprocating unit with a lower original water rate. Don't spend your Sunday packing pumps, but pack up your troubles with a centrifugal boiler feeder driven by

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TERRY SQUARE
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ings, 5 to 10 lbs.; drying, 5 to 20 lbs.; evaporating, 20 to 50 lbs.; cooking, 60 to 120 lbs. The first three—heating, drying and evaporating—are about in one class; that is to say, if they were the only pressures to be considered, the upper limit would determine the boiler pressure of the mill and the other pressures would probably be obtained by throttling, but as they are not the only conditions to be satisfied, steam for evaporation is generally considered separate from the heating of buildings and the drying of paper. When large quantities of steam are involved for the various processes the reasons for separating the sources of pressure become even more distinct.

Steam for cooking is a feature by itself and so far has been obtained almost entirely direct from the boilers or by throttling the boiler pressure. Based on information obtained from various paper chemists, it is understood that a maximum total temperature must not be exceeded and further that high pressures raise the cost of digesters beyond economical limits. Therefore, it is quite clear that if cooking steam is obtained direct from the boilers or throttled, the total heat, and, therefore, the pressure and temperature of the boiler steam is immediately determined by the total heat permissible in the digester.

Certain elements enter into the cost of generating steam. They are the cost of equipment, such as boilers, grates, steam piping, housing, etc., as initial investments to which must be added insurance, taxes and depreciation and again the cost of maintenance and operation including labor and fuel. Fortunately, the cost of steam does not directly depend upon its pressure; that is to say, it is not much more expensive to obtain higher pressures than moderate pressures. For the higher pressures the additional initial investment is only a fraction of the investment for low pressure; therefore, the fixed charges are not materially increased when higher pressures are considered. The item that is directly affected is fuel; and the extra amount used is in direct proportion to the heat of the higher pressure over the lower; labor and maintenance are also somewhat increased.

Steam turbines depend upon the available energy in the steam for their mechanical power. As the pressures increase, more energy is placed in the steam and, therefore, less pounds of steam are required to accomplish the same result. For smaller amounts of steam it can readily be seen that less initial investment and, therefore, lower fixed charges and operating cost follow in order. The limit to which the initial boiler pressure of the paper mill can be taken is determined as before mentioned by digester temperatures. If there were no digesters, however, the limit is again determined by the amount of energy required for process steam and the amount of energy required for mechanical work. The two must balance each other or mechanical energy must be called in to make up the deficiency. This means additional cost of equipment and added operating expense.

It is not beyond the possibilities of turbine design to utilize the highest pressures that boilers and piping can stand. Turbines can be made to exhaust at temperatures useful in digesters; that is to say, a non-condensing turbine could be placed between boiler pressure and digester pressure. However, to make such a turbine pay, the amount of steam must be large, the rate of flow must be regular; that is, a number of digesters should be in continuous service, so obtaining a high steam load factor. The initial pressure must be relatively high; that is, in the order of 250 lbs. or more. Very few cases have come to the attention of the author where this source of power can be even thought of, because the installations now made have not taken the possibility into consideration.

Methods Available for Obtaining Low Pressure Steam

Having the upper limit of boiler pressure determined from the digester temperature, or if no digesters are in use, from the standpoint of heat economy, the next step is to solve, in the most economical manner, the method or methods to be used to take out the available heat between boiler pressure and process pressures.

The amount of steam that is demanded by process and the heat in it determines the size of turbo-generators that can be utilized between boiler pressure and process pressure. There are, of course, variations in the amount of process steam as likewise there are variations in the demands for electrical power and the two do not always coincide. Flexibility must be available and in general it may be said for a completely electrified mill—that is, one which takes its raw materials from the log state through to commercial paper—the power demands are far in excess of that available from the heat contained in the steam used in process between boiler and process pressures. In general, it may be said, however, that it will pay to develop all the available energy that there is in the steam between boiler and process pressure making up the deficit from other sources such as water power or condensing steam turbines. There are some cases, of course, where this is not true. As we are dealing with general cases rather than particular instances, the previous statement may be used as a general rule. Each case must be settled by itself on the basis of one scheme against the cost of any other scheme.

There are occasions when low pressure steam generation would pay. These are very few and can be attributed generally to a surplus of water power. Electric boilers can here be used to convert the excess electrical energy into steam.

The chief methods, therefore, left for furnishing low pressure steam are:

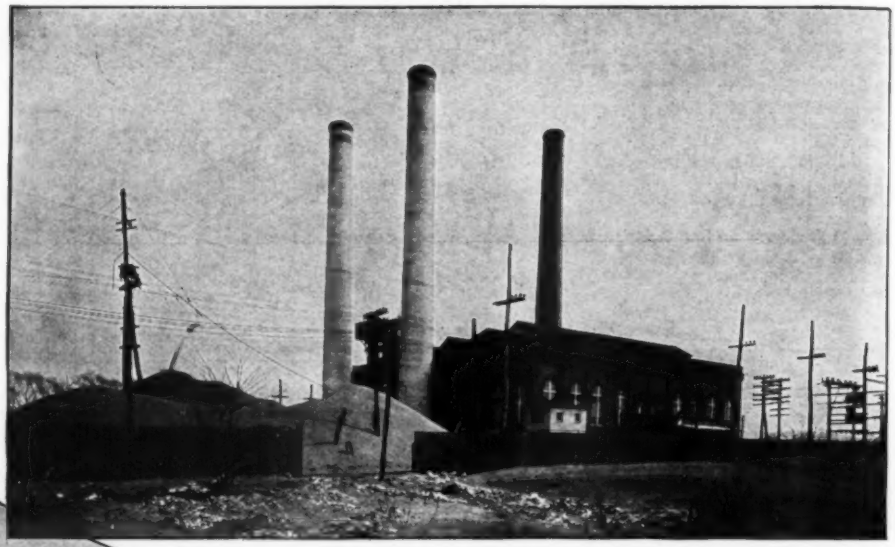
1—Throttling; 2—non-condensing turbines; 3—extraction turbines; 4—combinations of the first three.

Going back to throttling, it is interesting to note that there are very few instances when throttling itself would pay. These instances are becoming less as the public becomes acquainted with other methods. The loss of available energy by throttling is the cause of its decreasing use. It is, of course, understood that there is not actual loss of heat in the transfer from high to low pressure.

Whether or not the original designers of paper machines and engines had in mind the balancing of mechanical power with heat obtainable from the exhaust of the driving engine is hard to ascertain, but in any event, they came fairly close to getting what was most economical from this standpoint. Turbo-generators with motor drive on the paper machines seem to fulfill the two requirements even better than engines and at the same time give closer speed regulation. Unfortunately, some rather loose work is done at times, which disturbs this balance and gives an excess of generating capacity or low pressure steam. In some cases where the designers realize that they are not getting a balance, they cover it up by putting in turbines of very low economy. A little more thought on the available heat energy required would determine the economical initial pressure. Some cases demand that the turbine be fairly uneconomical because it would cost too much to change other parts of the plant to realize the economy in turbine performance.

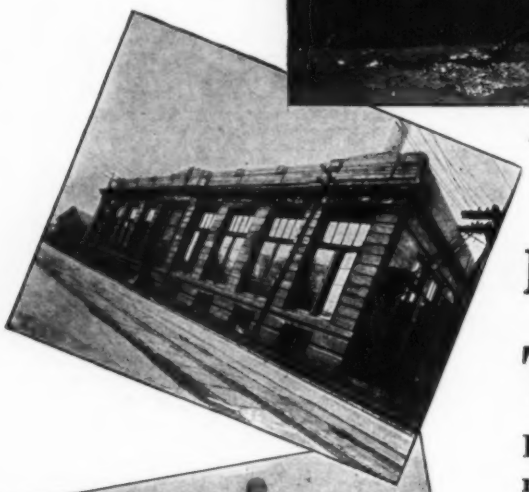
Variations in the quantity of steam required with constant electrical demand such as seasonal heating and low pressure cooking in odd cycles tend to limit the use of non-condensing turbines. Steam accumulators have been developed and are in use in some mills which wipe out the variations in steam demand and act as reservoirs to take excess steam when it is not required in the process and to give it up when the electrical demands are low. A great many mills have been successful in economical operation without accumulators because their systems are flexible enough to absorb excess and to furnish demands. The electrical end is usually taken care of by operating the non-condensing turbines in parallel with hydro-electrical units or condensing turbines having the non-condensing turbine designed to give the maximum amount of steam required, filling in the electrical demands from the parallel sources of power; that is to say, the non-condensing turbine floats electrically on the rest of the system furnishing electrical energy in direct proportion to the steam demand.

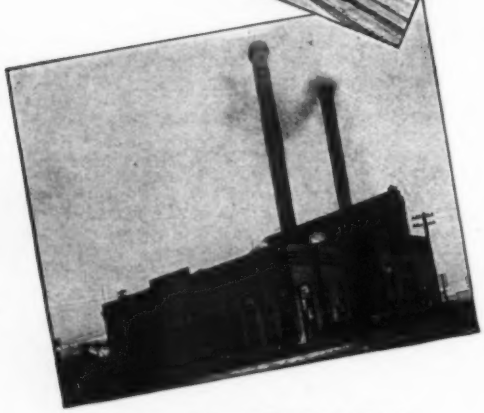
The latest types of paper machine drives are utilizing direct current for the paper machine motors. Motor generator sets, alternating to direct current, with alternating current as the prime mover coming in either from steam turbines or water power supply the power. Relatively cheap prime mover power must be available for this method, as the fixed charges and losses of the motor generator set are to be added to the prime power costs to arrive at direct current power costs. The other alternative is to utilize non-condensing direct current turbines. The size of the electrical ends are fixed by the paper machine drives. The amount of steam available for the turbine is fixed by the drying demands of the paper machine. The adjustable unit between the two is the heat content of the steam at the turbine throttle. As pointed out before, this is governed by other conditions within the mill which are variable within reasonable ranges. Speed regulation of the turbine is obtained by the governor. The paper machine drive, however, demands that the voltage be variable in order to get speed ranges on the paper machine. Voltage regulators can be used to keep the speed of the paper machine constant at pre-determined speeds due to the demands of the paper machine for adjustable speed. The DC turbine and motor-generator set are not available for other uses. On the other hand, the exhaust steam from the turbine can be alternately furnished to the paper machine which the turbine is driving or to other paper machines or process. Some mills prefer even to isolate the exhaust of their turbines so that there can be no chance of other demands affecting the supply of steam to the machine in question. Even with an accurate balance between mechanical power and exhaust steam laid out



Above—The Harrisburg Light and Power Co., Harrisburg, Pa., where Turner Baffle Walls are in use.

Below—The Power Plant of the Harrisburg Railways Co., Harrisburg, Pa., equipped with Turner Baffle Walls.





The New Orleans Railway & Light Company's Plant at New Orleans, La., equipped with Turner Baffle Walls.

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on paper it is not thought advisable to eliminate an alternative source of steam from consideration in most plants. This is done by high pressure make up.

The non-condensing turbine for paper machine drive is not the only one that can be used to advantage in the mills where super-calendars, low pressure cooking and heating of beater water, bleaching, etc., are done. The supply of low pressure steam to these demands is a fine opportunity to obtain electrical power due to the difference in available energy between boiler pressure and process pressure. In this case alternating current generators would generally be used operated in parallel with other sources of the same type of current.

To summarize the non-condensing turbine, it may be said that in general its function is supplementary to other sources of electrical energy but that when so used it is more economical in its use of steam per KW of output than other types of turbines supplying an equal amount of electrical energy and exhaust steam.

Extraction Condensing Turbine

The extraction turbine has an internal grid valve consisting of stationary and a moving annular ring with ports open in each of oblong sections. The blanks on the stationary ring provide means of shutting off the steam from the ports on the moving ring. Through an opening in the turbine casing at the high pressure side, the grid valve opens or closes to force out more or less steam, so giving a constant pressure in the extraction line. With an adjustable diaphragm in the extraction line, various pressures can be held for different quantities of steam demanded. Some steam is always required on the low pressure side of the grid valve which is not wasted but produces mechanical energy while it passes to the condenser. As less steam is passed out of the extraction line, more is required in the low pressure cylinder to carry a given electrical load; therefore, we have the combination in this turbine of a straight condensing turbine and a non-condensing turbine to supply variable steam and electrical demands. The variations in each need not coincide with each other. For moderate size plants which do not have low cost power from condensing turbines, extraction turbines frequently work out to be less expensive than the combination of condensing turbines with non-condensing turbines. This is especially true where there is a widely fluctuating demand for steam both hourly and seasonal. This can be readily understood if we consider that the non-condensing turbine must be arranged on both turbine and generator ends to correspond to the maximum demand for steam. If this is not done high pressure make up must be used. At the same time the condensing turbine operating in parallel must also be of such size as it will carry the maximum electrical load; therefore, we duplicate, so far as electrical capacity is concerned, a certain proportion of the required capacity in each generator. On the other hand, the extraction turbine has but one generator and two steam cylinders either one of which or both are capable of meeting both the electrical and steam demands.

To differentiate and determine which scheme should be used, the non-condensing or the extraction turbine, it is necessary to balance up the heat required to perform the various functions in the mill. If these problems are analyzed on a heat unit basis, the various parts will be shown up in their true value allowing a close balancing of the opposing amounts.

Pulverized Coal*

BY F. W. DEAN

Wheelock, Dean & Bogue, Inc., Boston

THERE are reasons for believing that the pulverization of coal furnishes the most perfect, and, in fact, the ultimate means of burning that fuel with completeness and therefore with maximum economy. Moreover, it provides means of consuming coals of the qualities with which other means fail, and it does this with the same degree of perfection that is realized with coal of the better and best grades. Thus it renders available coals that possess so much sulphur and whose ash fuses at so low a temperature, that they are unworkable by other means of combustion. Similarly, it removes the difficulties of burning lignite, so that those vast deposits of half formed coal that are found in the western part of North America, yield to it as well as true coal.

The advent just now of perfected means of producing pulverized coal is most timely and will assist the owners of industrial plants in keeping down fuel costs at a time when they, and the cost of attendance, are causing grave concern. The employment of fuel oil promised to be a means of accomplishing this and in consequence of its many advantages and low cost of attendance, but the uncertainty of occurrence, the admitted growing scarcity and increasing cost, the importance of its use as fuel at sea, and its many imperative uses on land for other purposes than steam-making, give strong reasons for believing that it must soon be abandoned as fuel on land. In fact many persons consider it almost criminal to use oil for boiler and house heating fuel.

I have said that pulverization furnishes the ultimate means for the attainment of economy in the combustion of coal. This is so because all but the smallest fraction of the fuel is burned, there being less than one-half of one per cent of carbon in the ash against, say, anywhere from 15 to 40 per cent by other means, and because of the perfection with which the burned portion is consumed. A higher per cent of CO_2, usually accompanied by CO, can be realized than is attainable by any other means. The importance of this will be realized when it is stated that a pound of carbon when burned to CO_2, yields about 1,500 B. T. U., and when burned to CO, 4,300 B. T. U.

On account of the complete mixing of the coal with the air of combustion, less surplus air is necessary than by any other means. Just so much less air requires heating, and less surplus escapes from the chimney with heat which cannot be reclaimed. Incidentally, a given chimney has more capacity from this cause than when serving other means of combustion.

More Perfect Combustion Required

Having made some general remarks with reference to the advantages of pulverized coal as a heat producer, it is important to explain the means by which the results are brought about. The coal is pulverized to a very high degree of fineness, such that, in general, upwards of 70 per cent will pass through a screen having 40 thousand openings per square inch. This screen is formed by wire of .002 inch in diameter with 200 spaces between them in one inch of width and as there are two sets of these wires at right angles to each other, there are forty thousand openings in a square inch. Such a screen is known as a 200-mesh screen. Coal that is so fine that from 75 per cent to 85 per cent of it will pass through such a screen, is exceedingly fine, and when thoroughly mixed with air, is in a condition to burn much like gas and with great completeness, if the temperature is sufficiently high. The temperature required comes from the incandescent brickwork of the furnace and from the coal already burning. When air accompanies coal in intimate contact with the very small particles, it is evident that the conditions for combustion exist to great perfection and that only a small air surplus is needed. Thus nearly all of the coal is completely burned. This perfection of combustion is still further brought about from the fact that the process of pulverization to a great extent breaks the earthy matter away from the carbon and thus exposes the latter to intimate contact with the air.

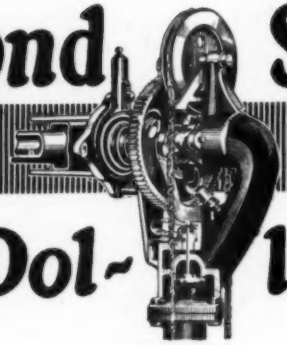
It is apparent from these considerations that most excellent combustion results, and that CO is conspicuous by its absence.

The question is naturally asked, how is the fire started, and the answer is, that this is done just as with any other means of burning fuel, that is to say, with wood, oily waste, or a stream of oil.

In combustion, a certain amount of air is theoretically needed to effect complete combustion, but on account of the difficulty of properly mixing the combustible portion of the fuel with the air, a great excess of the latter is necessary with hand or stoker firing. With pulverized coal, as already stated, the excess air is small, and can be so reduced that a high furnace temperature results. This temperature can be sufficiently high to melt the ash, and slag results. The slag is troublesome and is prevented by keeping the furnace temperature down. One way is by making the furnace with a water tube lining on sides, ends and bottom connected with the boiler in such a way that there is a natural circulation through it from one end of the boiler to the other. The tubes are covered with box tiles. The tubes keep the tiles in good condition while the latter are still at a sufficiently high temperature to maintain combustion. The tubes also prevent the brickwork from being injured, and the setting is made permanent. Besides this they add to the heating surface of the boiler and improve the economy. Another way of preventing melting of the ash is to build the furnace walls with air spaces which are supplied with air from outside and deliver it at advantageous points in the furnace. This is the usual method. The air in circulating cools and helps to maintain the brickwork while it cools the ash which falls as a fine, light colored powder. In consequence of this cooling and the absence of local impingement of hot gases on the brickwork, the life of the latter is prolonged. The furnace is assisted in resisting the heat by the air that enters through the air ports and rises so as to veil the walls. Sometimes the water jacket is used on the bottom of the

*Presented at the Fall Meeting of the New York Division of Superintendents, Carthage, N. Y., November 17, 1923.

The Diamond Soot Blower Story in Dollars and Cents



HERE is a comparison between blowing a boiler by the hand lance method and by mechanical soot blowers of both the independent valve type and the Valv-in-Head type. A 500 h. p. boiler is assumed, 200 lb. steam pressure, operating at 175 per cent rating, on a basis of the boiler being operated 300 days of 20 hours each per day, with an evaporation of 8 lbs. and a coal cost of $5.50 per ton fired under the boiler. The figures are based on the boiler being blown twice a day with mechanical soot blowers as against once a day with hand lance.

Steam consumption is figured on the basis of each soot blower valve being open a total of 60 seconds each time the boiler is blown in the case of the independent valve blower and 30 seconds in the case of the Valv-in-Head blower. Hand lance steam consumption is figured on a total flow of 20 minutes through a ¾" nozzle.

Operating Cost per Year with Hand Lance

Steam	$300
Labor (2 hrs. per day)	240
Maintenance	25
	$565

Operating Cost per Year with Mechanical Blowers

	Independent Valve Type	Valv-in-Head
Labor	$ 60	$ 36
Steam	184	92
Interest at 6 per cent	40	45
Depreciation and maintenance 20 per cent	132	148
	$416	$321
Decrease in operating cost due to mechanical blowers	$149	$244

Many actual tests have demonstrated that the savings in fuel effected by mechanical soot blowers over the hand lance run from 2 to 8 per cent.

A boiler operating under the conditions named would consume 10,500 tons of coal in a year's time. Figured at $5.50 a ton, this would amount to $57,700 per year.

1% saving in fuel would amount to $ 577
2% saving in fuel would amount to $1150
3% saving in fuel would amount to $1730
4% saving in fuel would amount to $2310
5% saving in fuel would amount to $2885
6% saving in fuel would amount to $3460

From the above it will be seen that soot blowers commonly pay from 125 per cent to 800 per cent per year on the investment.

Ask for Bulletin 297

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Diamond
Soot Blowers-Save 4 to 8% Fuel

furnace in combination with the air cooling, this being the case when the furnace is so wide that the air will not penetrate sufficiently far.

As might be expected, there is but little smoke from pulverized coal.

While all of the conditions seem to be present for immediate combustion of pulverized coal, the fact is that time is necessary. As the fuel is still in small particles, moving with considerable velocity as it enters the furnace, a long travel for complete combustion is necessary in order to provide the time. This gives rise to the requirement of considerable furnace volume, and the volume usually taken is two cubic feet per horse power to be developed, but not per rated horse power of the boiler. Small furnace volumes will do for rated horse powers. It is important that the fuel should so enter the furnace that the whole volume of the furnace is utilized. Pulverized coal is not alone in requiring considerable furnace volume, as oil, especially with some burners, requires it, and it is not uncommon to provide boilers which are fired by hand and by stokers with sufficient volume for pulverized coal.

Features of This System

The fact that the furnace is empty is an attractive feature of pulverized coal, and another, equally attractive, is that no part of the apparatus is subjected to heat. Still another important feature is that all of the coal used for starting up is utilized, and none of it remains in the furnace after the supply is stopped. In the case of stokers, a cart load of coal may be put in the furnace when starting, and other left in after the demand for steam is over.

From the last paragraph, it is evident that no coal is used for banking. When the demand for steam ceases, the supply of coal is discontinued and the furnace openings and stop valves are closed. The brickwork remains hot and there will be steam pressure in the morning. When the time of starting arrives, a little wood or other kindling is used and the coal ignites immediately. Thus there is very little if any smoke when starting. When starting an absolutely cold boiler, more kindling is required and some smoke results.

It is best to use nearly balanced draft with pulverized coal, as by that means the furnace volume will be better utilized and leakage of air through the furnace walls will be diminished.

The question is often asked whether any dust escapes from the chimney of a pulverized coal plant. There undoubtedly is dust, as there is from hand or stoker fired plants, but it is a much less harmful kind. It is a very fine, clean and sootless powder, and is so light in weight that it spreads over a great area and is with difficulty identified. In fact, of the various persons whom I know that have been so situated that they would notice dust if it were present, not one has seen any.

Some makers of coal pulverizers find it necessary to dry the coal in order to prevent it from blocking up the machine with a doughy mass and prevent its being removed by the suction fan which transfers it from the pulverizers to the storage bin. Other pulverizers do not require the coal to be dried.

On the general subject of drying, it can be said that it is justifiable if it can be shown to be a good investment, considering the fixed charges of the apparatus and the economical results obtained. It is not a good thing to dry the coal before it is pulverized, because it may, on account of its temperature, produce explosions after pulverization, especially if it has been dried by a live fire. While explosions of pulverized coal are not expected, and are infrequent, it cannot be ignored that they have taken place and are possible. If, however, the drying is done in the pulverizer itself, of a non-storage system, especially if waste heat is used for this purpose, economy results and explosions do not occur. In this case it would seem that the results would justify the expense.

Fortunately, there is not much moisture in eastern coals, rarely reaching 5 per cent, and commonly being 1½ to 2½ per cent.

Summarizing the reasons for economy of coal by pulverization, they may be stated as follows:

1—Practically all of the coal is burnt, there being almost none in the ash; 2—The combustible elements of the coal are more completely burnt to CO_2 than by any other means; 3—All of the coal in starting is utilized; 4—When stopping, no coal is left in the furnace; 5—No banking coal is used, and no standby losses occur except by radiation; 6—Coal that fails to burn in suspension and falls to the bottom of the furnace burns slowly; 7—Accurate control of air to accompany the fuel used; 8—Instant change of rate of firing to

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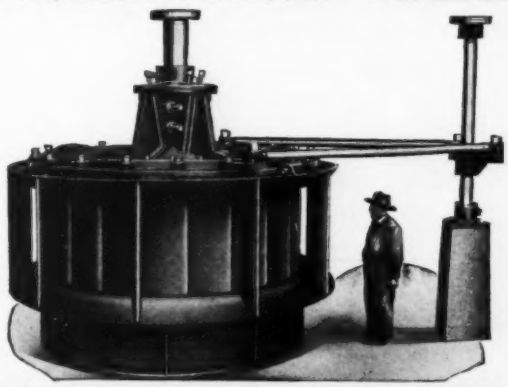

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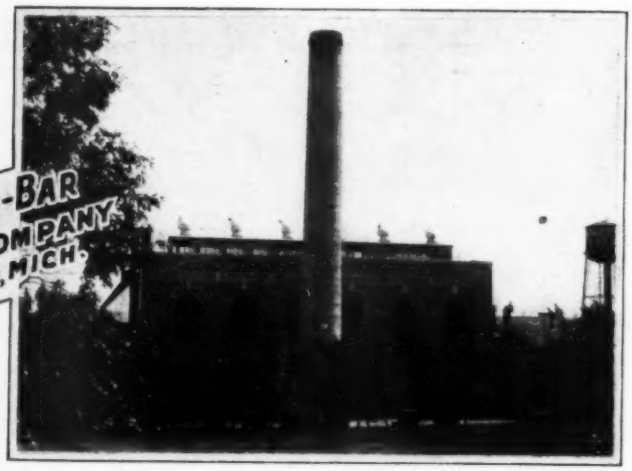

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meet needs; 9—Low draft requirements; 10—Low labor costs.

Pulverized coal has been used for some purposes so many years that the question is often asked, why has it so recently been used for boilers, and why is it now so suddenly popular? There are several reasons for this. One is that the economy expected was not formerly realized, and the reason for this was not fully understood. In consequence of this, it was used only for certain purposes where economy of fuel was of secondary importance. There was difficulty in pulverizing the coal to sufficient fineness and furnace design was not understood. In addition to this, stokers, and especially underfeed stokers, were developed to a high degree of perfection and carried everything before them. Pulverized coal, however, was smouldering, and there was a realization that if it could produce the desired results it would have some advantages over hand fires and stokers. Persistent efforts were continued, that time has now arrived, and it is the opinion of many who are competent to judge, that stokers have reached the apex of their use and must henceforth be on the decline.

The complexity and cost of the usual means of producing and feeding pulverized coal has been an obstacle to its introduction, but what is probably the oldest system is also the simplest. This is a system having a pulverizer which performs its work by striking the pieces of coal. If a piece of bituminous coal is tossed in the air and struck by a baseball bat, it is broken into very small pieces, and if the pieces are continuously struck to an advisable extent, to which there is no limit, fineness of pulverization is attained.

This machine receives coal in a hopper from which it is fed to a chamber of the machine in which there is a revolving disc to which a few paddles are secured. The coal is struck by them countless times and the greater part of the pulverization is done in this chamber. It then passes on and is struck by blades secured to a drum, which completes the process and delivers it to a fan, which is both the means of the travel of the coal and its delivery to the furnace.

The feeding mechanism can vary the coal supply through wide limits, and is adjusted by hand or by an automatic regulator. In the latter case it will assume the load up to its capacity limit, and in the case of a 72 in. horizontal return tubular boiler of 143 horse power, to which it is applied, it yields a horse power of 450, or 315 per cent of the boiler rating.

De Laval Flexible Coupling

The De Laval flexible coupling is described in a 12-page pamphlet issued by the De Laval Steam Turbine Company, of Trenton, N. J. This coupling, which has been developed for turbines or other motors geared or direct coupled to pumps, generators, and similar machinery, consists of two opposed flanges mounted on the driving and driven shafts respectively.

The flange carries bolts or pins which enter holes bored in the opposing flange, but not coming into metallic contact with the latter, as the driving force is transmitted through steel lined molded rubber bushings slipped over the pins.

The rubber supplies the flexibility required to take care of inevitable slight misalignment, does not require lubrication, absorbs shocks and is long lived and reliable. There is no constraint upon independent endwise motion of the shafts and one shaft can be removed without disturbing the other. The peripheries of the flanges are ground to true cylinders and the faces to true planes to facilitate lining up. All parts are made to limit gages and all similar parts are interchangeable.

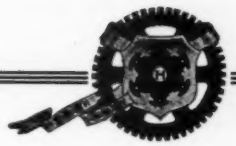
Kerr Turbine Extends Sales Organization

The Kerr Turbine Company of Wellsville, N. Y., announces several changes and a number of extensions in their sales organization, in which the following new agencies appear:

Starkweather & Broadhurst, Inc., 79 Milk St., Boston, Mass.; H. R. Hanson, 832 Real Estate Trust Bldg., Philadelphia, Pa.; Mechanical Engineering & Equipment Co., 209 S. High St., Columbus, Ohio; Southern States Equipment Co., 712 Canal-Commercial Bldg., New Orleans, La.; L. D. Howland, 606 Howard St., San Francisco, Calif.; Henry C. Ashmead, 824-5-6 Brown-Marx Bldg., Birmingham, Ala.

In addition to the above, their representation in Chicago has been increased by the addition of Mr. R. N. Turner.

The Chicago Belting Company are putting up their Sea Lion waterproof cement in a new package. The cement now comes in 1 gal., 2 gal. and 5 gal. cans. Sea Lion cement is the cement that is used in the manufacture of their Sea Lion waterproof leather belting and is impervious to water, moisture and steam.



Friction Clutch Engineers

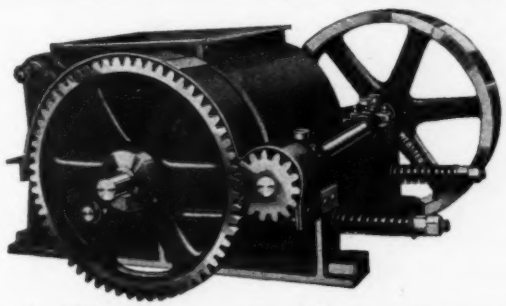
The big, broad field of engineering is made up of those who have made a specialty of some particular branch. The Hill Clutch Company's engineers have made a study of the design and application of friction clutches for a period of 37 years. Whenever you wish to consider friction clutches—and you probably have need of some in connection with your line shaft equipment or on individual machines, which you have never thought of—consult us.

You will be placed under no obligation in receiving our recommendations and quotations covering your contemplated requirements.

Our Catalog No. 8 contains a lot of clutch data well worth having handy for reference. Copy will be mailed upon request.

THE HILL CLUTCH CO.

General Offices and Plant CLEVELAND, OHIO
NEW YORK OFFICE: 50 CHURCH ST.



A Webster Coal Crusher in Your Power Plant

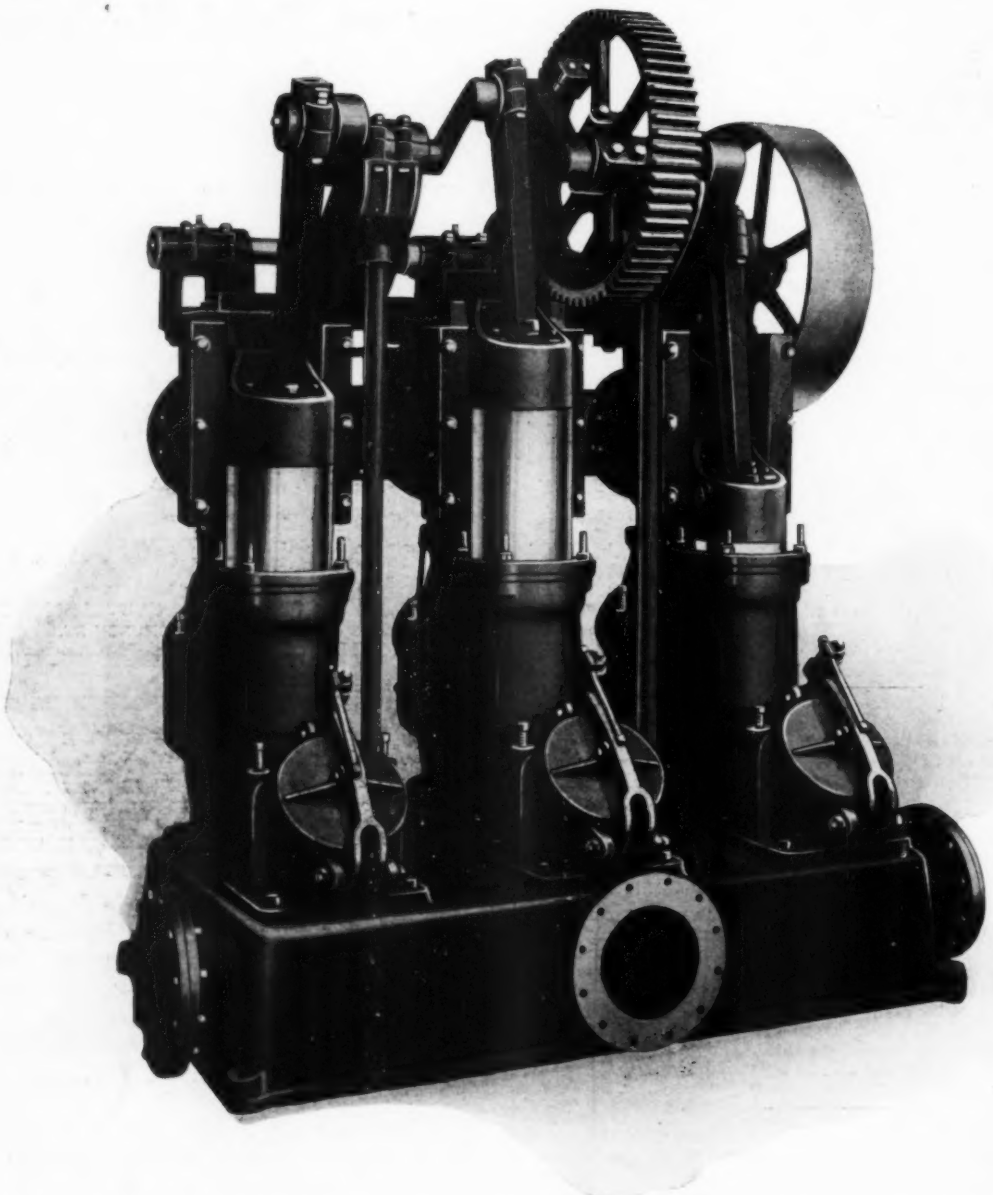
will insure a regular supply of properly sized coal for your automatic stokers at a low cost per ton.

They are built in single and double roll types, in capacities to handle 30 to 200 tons per hour.

Shall we send you our catalog showing our various types and sizes of coal crushers?

THE WEBSTER MFG. CO.
4500-4560 Cortland Street
CHICAGO, ILL.
Factories, Tiffin, O., & Chicago. Sales Offices in Principal Cities.

SHARTLE MIAMI PUMPS



THE first SHARTLE PUMP built is still in use pumping filler in a board mill. This kind of service is typical of the service rendered by SHARTLE EQUIPMENT.

SHARTLE PUMPS are built in capacities ranging from ten tons per twenty-four hours to one hundred and fifty tons.

NINE HUNDRED THIRTY-ONE SHARTLE PUMPS ARE IN DAILY SERVICE.

The Shartle Brothers Machine Company

Middletown, Ohio

Michigan News

Kalamazoo, Mich., December 1, 1923.

Board Division Meets with Michigan Superintendents

The Michigan Division of the American Paper and Pulp Mill Superintendents' Association held a joint meeting with the Board Division at the Park-American Hotel, Kalamazoo, on November 15th. The speakers were J. L. Williamson, Western representative of the Ross Engineering Co., who gave a stereopticon lecture on "Vapor Absorption." This appears on another page in this issue. Professor R. H. Hayward, of the Extension Department of the University of Michigan, spoke on the subject of "Save-alls." Owing to business conditions, the Board Division did not respond to a call for a joint meeting in sufficient numbers to make the annual election of officers possible. This will be done at the January meeting.

Those present were as follows: M. N. Brisbois, Sutterhland Paper Co.; Alfred Bryant, Bryant Paper Co.; Bernard Benson, Williams Gray Co.; Glenn B. Caffey, Goodrich Rubber Co.; J. L. Carter, J. G. Cherry Co.; E. T. Coughlin, Allied Mills; C. R. Crawford, Shartle Bros. Machine Co.; H. Denner; Frank Eilers, Eilers Mill Supply Co.; James B. Grinling, Allied Mills; E. H. Gilman, Bryant Paper Co.; J. W. Harbrecht; C. L. Harter, Rex Paper Co.; R. H. Hayward, University of Michigan; W. L. Hollis, Watertown, N. Y.; Ed Houson; Jacob Kuss, Allied Mills; William Lawrence, Paper Makers Chemical Co.; Albert Lindner, Allied Mills; Joe Loughead, Western Paper Mill Supply Co.; Martin Moulder, Allied Mills; George H. Pountain, Allied Mills; Charles Ranney, Mid-West Box Co.; Mike Redmond, Kalamazoo Paper Co.; Jacob Parent, Western Board and Paper Co.; Charles Shartle, Shartle Bros. Machine Co.; M. O. Smith, International Paper Co.; Harry D. Uevell, F. C. Huyck & Sons; George D. B. Van Tassel; H. E. Urich, MacSimBar Paper Co.; James Wright, William Cabble Wire Works.

Co-operative Plan with University Fails

The plan for co-operation of the University of Michigan and the local paper mills seems to have failed. The first plan brought up by the committee in charge, was to assess each mill a lump sum. The smaller mills protested against this. The next plan brought up was on the basis of so much per machine. This did not find favor in the eyes of the mill managements. The last thing suggested was to charge so much per pound of production, taking book as the standard, 100 per cent, and working up and down according to the rating production of the different mills. This plan was progressing rapidly until the University of Michigan raised the amount of money necessary 50 per cent. This caused the mill men to drop out.

At present the large mills are making connections with the University independently; they will not go in as a body.

The breaking out of the Monarch Paper Co. dam, on June 16, 1916, is still causing trouble. DeNoyer, a celery grower, lost his first crop through the dam breaking, and he is suing the Monarch for $900, the damage he alleges the water did to his celery. This is in the nature of a test case, and if it is settled satisfactory, the rest of the suits which have been filed, will be pressed.

The local division of the Cost Association of the Paper Industry held a meeting at the Lincoln School Auditorium on Tuesday, November 20th. The public was invited to attend the meeting. The speaker for the evening was William J. Kane of Detroit, who in connection with his lecture on "Economics and Accounting" caused a moving picture to be shown entitled "The Merchant of Mayville," which showed how modern methods increase profits.

Bert Cooper, purchasing agent for the Kalamazoo Stationery Co., has accepted the position of purchasing agent for the Dunn Sulphite Paper Co. of Port Huron, Mich. This company has just been organized by Theo. Dunn, formerly of the Detroit Sulphite and Paper Co. The new company is planning to start building at once.

At the public election held on Tuesday, November 6th, A. E. Curtenius, president of the Western Board and Paper Co., and Clarence A. Bradford, vice president of the Rex Paper Co., were elected to the City Commission of Kalamazoo.

Buck, Kaier & Company, Inc., importers of wood pulp, have removed from 342 Madison Ave. to 9 E. Forty-sixth St., N. Y. City.

In the beginning we set out to build a jordan engine that should give the utmost in jordan value.

Slowly and with great care we went about our work of developing a jordan in which performance, stability and reliability would be assured to the paper industry.

That a well-established paper-making concern, with years of paper-making experience, in equipping a model modern paper mill of unusual efficiency selected Appleton Jordans, we believe in a measure justifies our claim that Appleton Jordans give the utmost in jordan value.

That they have used Appleton Jordans in the past and have during the past year alone ordered eleven new Appleton Jordans, we believe in a measure justifies our claim that Appleton Jordans give complete satisfaction.

THE
APPLETON MACHINE
COMPANY

Designers and Builders of Paper Mill and Pulp Mill Machinery at
APPLETON, WISCONSIN

The Sandy Hill Iron & Brass Works

Hudson Falls
New York

Manufacturers of **Paper and Pulp Mill Machinery**

FOURDRINIER WIRES

Dandy Rolls *Cylinder Molds*
Brass, Copper and Iron Cloth
Bank and Office Railings

WIRE SIGNS

Cheney Bigelow Wire Works
Established 1842 SPRINGFIELD, MASS.

Wisconsin News

December 1, 1923.

Superintendents Arrange Spring Meeting

It was decided at the fall convention at Appleton, Wis., held on October 26 and 27, that the matter of selecting a place for the spring meeting of this division be left to the chairman, Mr. L. E. Smith, who was to appoint his own committee.

Mr. Smith and the committee met at the Whiting Hotel at Stevens Point, Wis., on Sunday, November 18.

After discussing the matter Marinette, Wis., was chosen as the place for the next convention, the dates being set as Friday and Saturday, May 2 and 3, 1924.

The officers were appointed for the Program Committee, and Mr. A. G. Stone of the Marinette and Menominee Paper Co., Marinette, Wis., was appointed chairman of the Committee of Arrangements. He is to name his own assistants.

Arrangements will be made to visit the mills at Oconto, Shawano, Peshtigo and Marinette in Wisconsin, and Menominee and Escanaba in Michigan.

A committee was appointed to arrange and report regarding the 1924 fall convention. Beloit and Madison, Wis., are desirable places on account of the paper machinery manufacturing plant at Beloit and the Forest Products Laboratory and State Capitol at Madison. This committee consists of Chairman L. E. Smith, Jos. H. Slater and B. T. McBain.

Those present at the meeting were: L. E. Smith, Chairman, Nekoosa, Wis.; A. G. Stone, Vice-Chairman, Marinette, Wis.; Wm. Kraske, Secretary, Wisconsin Rapids, Wis.; F. C. Boyce, Brokaw, Wis.; J. H. Slater, Escanaba, Mich.; John Adams, Stevens Point, Wis.; D. B. Davies, Green Bay, Wis., and B. T. McBain, Port Edwards, Wis.

Board of Directors of Wisconsin Forest Protective Assn. Meet

A meeting of the Board of Directors of the Wisconsin Forest Protective Association was called by President D. C. Everest and the meeting was held at the Bellis House, Wausau, Wis., on Thursday, November 22.

The main subject for discussion was the proposed Articles of Association and after careful consideration the draft was made up. Secretary McBain was instructed to send copy in duplicate of these to each and every member of the association requesting their signature, the return of one copy together with a statement of their last year's consumption of pulpwood or logs or both.

The problems of forest protection were thoroughly discussed and it was decided that the President would call a meeting in Chicago, Ill., of the association members as soon as all had returned their signed Articles of Association and consumption figures.

The above articles have been drawn up and copies have been mailed to each member. No time is being lost in getting this association going.

The following is a synopsis of the Articles of Association of the Wisconsin Forest Protective Association:

"A voluntary association of timber owners and users of the State of Wisconsin, in view of the rapid depletion of the Forest Resources within that State and the importance of conserving the Forest Resources on the remaining timbered area, and the further importance of encouraging the growth of timber on cut over areas in this section of the United States, the undersigned persons or corporation interested in the production or consumption of forest products within the said State of Wisconsin band themselves together.

"That the Directors shall meet on call of the President and have power to assess the membership up to a maximum amount per cord of consumption per annum.

"That the membership may be corporate or individual.

"The purposes as set forth are the protection from fire and other protection of growing timber; to aid in the propagation of timber for the wood-using industries of the States; and the Directors are instructed to use any and all legal means for arriving at these desired ends. The association has also the power to transact any and all other business as may properly be the business thereof.

"The annual meeting will be held in Wausau, Wis., the fourth Tuesday of each September each year."

There are the usual regulations for officers, including the bonding of Treasurer, and membership is for one year under certain conditions.

New Development on the Wisconsin River

Work has been commenced on the erection of a new dam and power house on the Wisconsin river at "Upper Merrill Power," located three miles above the city of Merrill.

The Wisconsin Valley Electric Company, with a present

LITNUM BRONZE

The New Metal for the Paper Industry

Our metal is the strongest and most acid resisting metal on the market. Our Beater Bars, Shell Bars, Plug Bars, Digester Covers, Liners, Sleeves, Strainers, Valves, etc., will outlast other makes several times. Our metal will not discolor the paper stock. It will not corrode and is tougher and stronger than steel.

We have some very interesting testimonials from Paper Manufacturers.

Write us for copies of same and prices of our castings.

LITNUM BRONZE CO.

Menomonie, Wisconsin

SIMONDS

Barker and Chipper Knives

The best knives for Pulp Mills. Made of the finest edge-holding steel, skillfully made and tempered right to withstand wear.

Write for Catalog and Prices

Simonds Saw & Steel Co.

Fitchburg, Mass. Chicago, Ill.

De Laval Centrifugal Fire Pumps

A DE LAVAL turbine-driven centrifugal fire pump insures instant, adequate protection, as the pump is always ready for service. It is simple in construction, containing no water valves and no steam valves, except the governor valve. The only metal parts in rubbing contact are the bearings, and the only packings are the simple ones about the shaft. The impellers, shaft sleeves, bushings, packing glands and oil rings are made of bronze. The turbine can be started immediately when needed without preliminary warming up. The photograph shows two De Laval Underwriter fire pumps driven by De Laval velocity-stage turbines and having a capacity of 1500 gals. per minute, each, against 350 ft. total head when running at 1740 r.p.m.

All De Laval machines are built to limit gages on an interchangeable basis throughout, and are thoroughly tested before leaving the works.

Ask for Catalog C 82

De Laval Steam Turbine Co.

LOCAL OFFICES

Atlanta, Birmingham, Boston, Charlotte, Chicago, Cleveland, Dallas, Denver, Duluth, Indianapolis, Kansas City

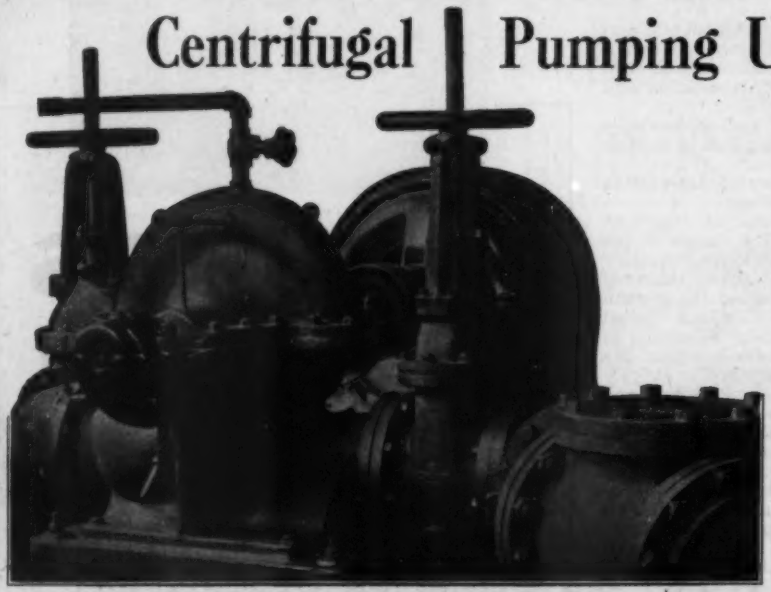
Trenton, New Jersey

LOCAL OFFICES

Los Angeles, Montreal, New York, New Orleans, Philadelphia, Pittsburgh, Salt Lake City, San Francisco, Seattle, Toronto

295

Centrifugal Pumping Units



Which Are Suitable For Paper Mills

There are different kinds of pumps for different uses in Paper Mills. You don't have to buy an experimental pump if it has an Allis-Chalmers nameplate. The right pump for each particular service has been proven by many applications and can be furnished from a complete line.

Write for Bulletin 1632 F.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

generating capacity of 11,000 H. P., will add 5,600 H. P. to their system when the new installation is completed. Power plants are located at Wausau, Stevens Point, Tomahawk and Merrill. The need for the new station was caused by the increased demand for electric power from the cities and towns that this company now serve.

A small crew of men have begun clearing up the site preparatory to the starting of the big job. When this preliminary work is completed, over 100 men will be employed to push the work so that both the dam and power house will be ready for operation within a year. A camp has been built to take care of the present and future crews. Mr. Henry Lorge of Wausau, Wis., is the construction foreman.

The power house equipment will be 3 water wheels and generators capable of developing 5,600 horsepower.

The dam will be solid concrete, with complete gate sections which will extend the entire width of the river. These gates will be twenty-six foot size, the large number enabling them to fully control all floods.

This dam will create a large lake which it is believed will beautify the shores of the river and will be close to the Grandfather Falls road, increasing the beauty of that splendid drive.

The McGillan-Asmuth Paper Mills, Inc., of Menasha, Wis., contemplate the building of a large addition to their converting plant, according to reports. It is planned to make improvements which will enable the company to about double the present production. The company is engaged in the manufacture of tissue and embossed glassine papers.

Pacific Coast News

December 1, 1923.

New Pulp and Paper Mill for Portland

Another demonstration of the advantages that the far Northwest offers to the paper manufacturer is the fact that early in 1924 a new $1,500,000 paper mill will be established in Portland, Oregon. The Portland Pulp & Paper Company, as the new firm will be known, has already filed articles of incorporation. Following are the men incorporating: Roy H. Mills of Portland, president; D. J. Fry and F. D. Thielsen, both residents of Salem, Ore.

In a special interview regarding the new industry Mr. Thielsen said, regarding the nature of the products they will manufacture:

"We plan on making heavy Kraft paper only, a tough and heavy grade of paper from mill refuse of nearby plants, thus utilizing a grade of waste timber that until now has never been used. Our schedule calls for about 50 tons of finished paper a day, each machine making a strip 160 inches wide and from 700 to 800 feet long each minute."

The Portland Pulp and Paper Co. will be erected in Portland near the Monarch mill, an option having already been secured on the proposed site. Two paper machines will be placed in the building, which will be approximately 80 feet by 300 feet.

The following board of directors has been placed in office: F. D. Thielsen and Hugh G. Boyer of Salem, Ore., D. J. Fry, R. H. Mills, E. M. Fouch, N. J. Sykes and R. R. Clark of Portland. Mr. Mills is now in the East placing orders for machinery.

Washington to Build New Sulphite Mill

A new sulphite pulp mill of 55 tons daily capacity will be built shortly by the Washington Pulp and Paper Co., Port Angeles, Wash., which, when added to the present buildings of this concern, will bring its total investment in fixed properties to over $4,231,000.

The manufacturing plant consists of a nine-unit, 110-ton mechanical pulp mill, a 55-ton sulphite pulp mill, and a 130-ton paper mill, on approximately 60 acres of land fronting on deep water.

The company has issued first mortgage sinking fund 6½ per cent bonds, maturing in 1938 at 95½, to yield 7 per cent, and from the proceeds of this issue will defray a portion of the cost of building and equipping the new unit. The present investment in fixed properties of the company are $3,231,000, and a million dollars more will be expended on the proposed improvements.

During the first eight months of 1923 the net earnings amounted to $335,000, which is five times interest on bonds outstanding.

Quotation of the stock of the Crown-Willamette Paper Company at Oregon City, Ore., have been lowered from $400 to

MITTS & MERRILL

Conveyor or Gravity Feed Shredder

THE operation of a beater, with its wear and tear and tremendous power consumption, has one primary purpose, namely, hydration. Anything that will economically bring about hydration more quickly relieves the beater just that much, cuts down on operating costs and speeds the process of paper making.

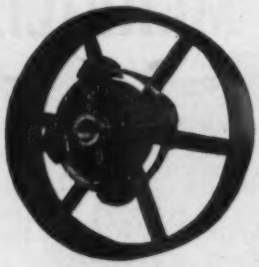
The Mitts & Merrill Shredder performs on magazines, books, old paper and boxboard, frozen or dried pulp laps, roll and sheet stock, in such a way as to greatly reduce their resistance to hydration when they reach the beater. It gives the beater an economical lift.

Our Shredders are built in sizes with spouts ranging from 18″ to 45″ wide. We will be glad to quote you on any size adapted to your requirements.

We also build a 100% efficient "Hog" to reduce pulp mill bark and wood refuse.

MITTS & MERRILL

1013 Tilden Street, Saginaw, Mich.



FALLS SOLID FRICTION CLUTCH PULLEY

A complete line of

Power Transmission Machinery

FOR

BELT AND ROPE DRIVES

MANUFACTURED BY

THE FALLS CLUTCH & MACHINERY COMPANY

NEW YORK
298-298 Fulton Street

Cuyahoga Falls, Ohio

BOSTON
52 Purchase Street

Catalogues upon request

VEELOS

TRADE MARK REGISTERED U.S. PAT. OFFICE
JUNE 21st, 1910

VEELOS

Genuine Balata Belting

The Ideal Belt for Paper Mills
Highest Quality Material
Best and Finest Workmanship
By Most Highly Skilled Craftsmen
Power-Saving Long-Lasting
On Service Basis Cost Is Lowest
Try a VEELOS

THE STANDARD BELT OF THE WORLD

Manheim Manufacturing & Belting Co.
Manheim, Pa.

Guaranteed Perfect

Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.

Order these to replace worn-out balls.

We make a specialty of repairing stuff pump balls.

We also manufacture—
SOLID BRASS BALLS
IRON AND STEEL BALLS
BALL CHECK VALVES
VALVE FACING TOOLS

The Draper Manufacturing Co.

Port Huron, Mich. Petrolea, Canada

Every ball bears our registered trade-mark

THE JOHNSON FRICTION CLUTCH

Double Clutch Exterior

Is Also a Clutch for Reverse Drive on PAPER MACHINERY

When used on the countershaft one pulley is mounted on each hub of clutch and thru one open belt and one crossed belt the operation of a machine may be quickly and easily reversed.
Reverse motion may be obtained by installing the clutch between bevel gears on machinery.
Spur gears are often used to get two speeds on machinery.
The Johnson Clutch requires the minimum of space. It is smooth in its pickup and does not grab like a jaw clutch.

Write for Catalog PI.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

$100, due to the fact that employees of the company are now permitted to buy from the treasury common stock in limited lots at par. The market value remains at $400 and outside of purchases made by employees, no stock is sold for less.

A small new pulp plant is to be built by the Crown-Willamette Paper Company of Oregon City, on its holdings at Young's River, where logging operations take place. Electric power will be developed at the falls, which, besides operating the pulp plant, will also serve the company's unloading facilities at tidewater and provide lights at the logging camp.

Complaint against the rates on news print between Oregon City and Salem, Ore., have been filed with the Public Service Commission of Oregon by George Putnam, publisher of the Capital Journal. In the complaint, protest is made against the present distribution system, wherein mill owners ship goods first to Portland by boat, and thence to Salem by rail. The newspapers of Salem resent paying what they term an additional 9 cents per 100 pounds.

The plant of the Hawley Pulp and Paper Company at Oregon City, Ore., which was completely destroyed by a recent fire, is to be rebuilt on the same site, announces W. P. Hawley, president of the firm. A new large paper making machine will be named William P. Hawley III, in honor of the new son of the vice-president, William P. Hawley, Jr.

Canadian News

Quebec, Dec. 1, 1923.

The danger of an embargo on pulpwood exported from Canada seems to be far remote. It is the conclusion that may be arrived at from the testimonies given up to date before the Royal Commission appointed to investigate upon the feasibility of adopting such a decisive measure. At the worst, a mitigated embargo may be enacted, but its links will be so wide apart that the export interests will not suffer in the least. Several interests are at stake. The settler, the manufacturer, and the exporter each are fighting their own end, and the politician, as usual, is playing his deceitful game. The question is still acutely debated in the press and controversies exchanged between the partisans of the status quo and the protagonists of the embargo.

This situation accelerates the exports. In 1922, out of 3,923,000 cords of pulpwood cut, 1,011,332 were exported. The exports in value were divided as follows between the Canadian provinces:

British Columbia	$ 3,279,567
New Brunswick	4,539,130
Nova Scotia	1,103,057
Ontario	5,107,303
Quebec	20,735,126
Total	$34,764,183

The evidence given before the Royal Commission in Eastern Canada is largely opposed to an embargo upon the exportation of pulpwood. Of course, the manufacturer's evidence has been from an ex parte point of view. But the settler's interests must not be disregarded. The clearing of trees and the selling of the wood is essential to the successful settling of the land. The money the settler gets from his pulpwood is his sole income during his early days on his homestead, and an embargo would destroy his market and bring him face to face with starvation. On this side of the question it is contended that Canada's needs is not so much an embargo as conservation, and more care in the exploitation of her forests. There is no doubt that conservation methods for the safety of Canadian forests must be more intensive and more efficacious; that legislation with regard to forest fires must be amended and penalties made more drastic in order to bring the people to a proper realization of the necessity for preserving and recuperating the wonderful Canadian forest heritage.

One manufacturer from the Province of Quebec has made the following statement before the Royal Commission:

"To produce 1,088,205 tons of pulp, 1,405,440 cords, or 702,722,000 feet, board measure, of pulpwood were consumed by 46 mills. In addition, 553,836 cords, or 276,918,000 feet, board measure, were used for other forest products; the whole accounting for a total wood cut of approximately 1,905,000,000 feet, board measure. To this consumption must be added in the future 500,000 cords of pulpwood—an amount that practically equals the present export—to provide for new mills or paper machines under construction. It is only with the most intensive protection and the strictive conservation that it will be possible to maintain this vast supply of raw mate-

The Gold Brick Won't Stand Fire

There is a definite standard of fire brick value; it is not the cost per thousand brick because:

1st. All fire brick at a given cost have not the same production value. One will produce more than another: therefore

2nd. The actual standard is what a brick will do for each dollar—how many tons' production per lining, or how many months between replacements per dollar of first cost.

We are prepared to show you the results of exhaustive tests in actual service

Buy Elk value in fire brick

ELK FIRE BRICK CO.

St. Marys, Pa. Philadelphia, Pa.
Buffalo, N. Y. Boston, Mass.

IN CANADA:
ELK FIRE BRICK CO. OF CANADA, LIMITED
HAMILTON ONTARIO, CANADA

DUXBAK BELTING
TRADE MARK

for

wet places,
dry places,
hard drives

—an ideal belting for paper mill drives

Send for Catalogue

DUXBAK BELTING TRADE MARK

Chas. A. Schieren Company

Tanners
Leather Belt Mfrs.

Main Office and Factory
73 Ferry Street, NEW YORK

Machine Room Started to Drip Yet?

Last call for Heating and Ventilating Systems for use this winter

Use a "BRINER" ECONOMIZER and cut the heating load off your boiler

J. O. ROSS ENGINEERING CORPORATION

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Paper Machinery

Plunger Stock Pumps—Single, Duplex & Triplex

"Frederick" Special Centrifugal Stock Pumps

Millspaugh Suction Couch & Press Rolls

Granite Press Rolls.

Calender Stacks

Pope Reels

English Reels.

rial to provincial forest industries. In some districts a timber shortage is already well in sight, and it will be necessary for the mills operating there to purchase all the available pulpwood that is produced in the Province. There is, therefore, no surplus supply for export, and mills in Quebec are going to be short exactly the quantity of wood that is sold to mills in the United States, unless our forest reserves are depleted in defiance of conservations. This means that they will be unable to operate at capacity and will give less employment to labor."

But the other side of the question is also deserving attention. The government of the Province of Quebec is decidedly against the embargo, and it is expected that the Ontario government will take the same stand.

At all events, we are safe in concluding that the danger of an embargo is far remote, because of an order-in-council that was passed excluding practically all pulpwood intended for export from the operation of any embargo that might be imposed, thus crippling any future enactment.

The Fort William Paper Co., of Ft. William, Ontario, are planning to double the capacity of their plant. The present capacity of the plant is 120 tons of groundwood and 160 tons of news print daily. The enlargement contemplated will involve an expenditure of between $2,000,000 and $4,000,000.

Rumor has it that the St. Regis Pulp & Paper Co., with headquarters at Watertown, N. Y., are contemplating the establishment of a pulp mill at Cap Rouge, Quebec, Canada, which will cost approximately $4,000,000.

Foreign Correspondence

German Paper Situation

The following figures have been supplied by the Imperial Statistical Bureau. The country obtains 40 per cent of the wood for this industry from abroad, the cellulose factories get even 70 to 80 per cent from there. Germany consumed during 1922 7.1 cubic meters (800 lbs. each) against 7.6 cubic meters in 1913; thus the pre-war figure has nearly been reached. In 1922 about 610,000 tons wood pulp were produced against 674,000 tons in 1913, and cellulose 721,000 tons against 839,000 tons in 1913. The total paper output of 1,582,000 tons reached nearly that of 1913, viz., 1,611,000 tons. Wood was imported, one-fourth or more, from Austria, Poland and the Baltic States, the rest from Russia; rags from France, Belgium and Holland. The export of wood, rags and pulp has been small. The export of cellulose has gone down one-half, especially as regards Great Britain, which buys now more from Sweden and Canada. Owing to the increased paper consumption abroad and the great economy practiced at home, the export of raw paper and paper goods is now much greater than before the war, especially as regards printing, writing and hand-made art paper. Of the nations which formerly were not good customers, but have become heavy buyers now, we name: the United States, Argentine, Spain, Italy and France, while England buys now chiefly wrapping paper.

The situation in the autumn of this year has become somewhat precarious. In many industries, and also that for paper and articles made from it, the market has become quiet, so quiet that it looks as if it should come to a standstill. The chief buyers, the printing establishments, have small orders, hundreds of newspapers and trade journals have ceased publication, catalogues and advertising matter is printed only when absolutely indispensable. The other firms making paper goods complain about high prices of raw material which curtail their exports considerably. At home the saving of paper is quite enormous. Envelopes with an old address and stamp are used a second time, the old address being crossed out. Indeed, so much has this become the practice that this autumn the Minister of Mail has forbidden the use of such old envelopes, as too many losses and misdirections of letters were caused. As paper bags cost over 100,000 M, the merchants refuse to give the customers one free of charge; people are required to bring wrapping paper or bags with them. Many firms have dismissed workers, or they work only at alternate days. For obvious reasons this cuts down the profit while the numerous, extremely high rates and taxes increase the manufacturing expenses.

Since August the gold Mark has been introduced in the paper industry to serve as a basis for price calculations between factory, wholesaler and retailer, while the public pays in paper Marks. The amount of the latter changes nearly every day just as the value of the gold Mark or the dollar changes. During this first experimental month, the dollar rose from 1 to 10 millions, thus the prices for paper in-

Pulp and Paper Mill Machinery

Equipment of high quality manufacture which fills a need around Pulp and Paper Mills is being offered for sale by the Old Hickory Powder Plant at money saving prices.

Mammoth Jr. Jordan Engines. Maker Noble & Wood Co. Shell 5 ft. 6 in. long, with 10-in. inlet and 6-in. outlet. Capacity, 30 tons per 24 hours. Will run either direction at 350-375 R.P.M. Fitted with steel bar knives, block and oak fillers.

Welded Steel Digesters. Maker, Continental Iron Works. Capacity, 1300 cu. ft. Inside diameter, 8 ft. Length, overall, 27 ft. Working pressure, 110 lbs. per sq. in. Tested, 165 lbs. per sq. in. Each digester complete with cast iron supporting ring, hoppers, guides, and all accessories.

823 H. P. Stirling Boilers, type M-30, 200 lbs. pressure, with Westinghouse 8 retort stokers, Buffalo stoker engines, Vulcan soot cleaners, 100,000 cu. ft. capacity forced draft fans, Bailey flow meters, and all accessories.

Alberger-Curtis Boiler Feed Pumps, 8", 3 stage, 1050 g.p.m. capacity, direct connected to 181 H.P. Alberger-Curtis Steam Turbines, 150 lbs. working pressure.

Buffalo Forced Draft Fans, type T-D 9½, 100,000 cu. ft. capacity, direct connected to 225 H.P. Moore Steam Turbines.

Feed Water Heaters	Compressors
Corliss Engines	Accumulators
Motors	Steel Tanks
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Check the bulletin you want

No. 7 Tanks
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Write for prices, specifications, and further information

Old Hickory Powder Plant
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"Beat the Stuff That's Hard to Beat"

CLAFLINS meet every beating demand, stand the hardest usage, and deliver a greater percentage of properly beaten stock than any tub-beaters or other beating engines.

CLAFLIN ENGINEERS and PAPER MILL MEN can solve your most troublesome beating problems.

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WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
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WARREN IMPROVED PATENT DOUBLE DRUM WINDERS

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One Tissue Machine, 80 inch, with Marshall drive.

One Jones Standard Jordan.

One Ryther & Pringle Shredder.

One Nash dryer exhaust unit.

One super calender, 52 inch Holyoke, with cotton rolls.

Ten Marshall drives. Rice Barton and Fales self-contained type with 6-inch mortise gears.

Fan pumps: 4-inch and 6-inch Pusey & Jones centrifugal pumps; 6-inch and 8-inch Worthington Volute pumps.

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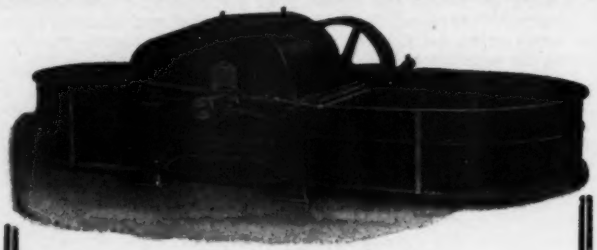

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Dayton Beater and Hoist Co.
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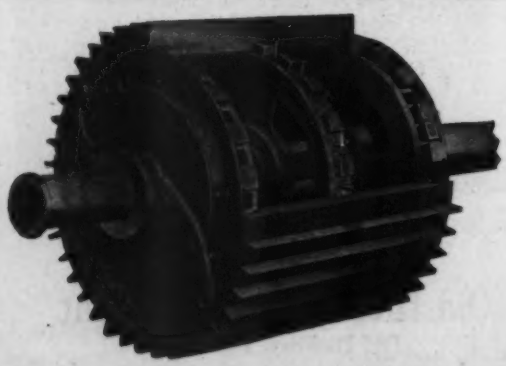

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DAYTON, O.

We manufacture Beating and Washing Engines, Head Gates, Hoists and Gears.

Our Wedge Type Bandless Roll made of semi-steel with special alloy bars is practically indestructible.

creased within a single month tenfold. Since that the rising has gone up fearfully. At the end of October, the price of one copy of a daily newspaper making up 6 to 8 pages (much smaller than those in the United States and England) is 1½ milliard, for which sum we could buy 300,000 motorcars at 5,000 M. each in 1914. If we take a bundle of several thousands one-Mark banknotes to a rag dealer he will give us for the mere old paper much more than is the nominal value. In lesser degree, it is the case with a 50 and 100 M. banknote, while a 1,000 M. banknote has a value of paper alone of 1,000 M., thus it is immaterial whether it is a falsificate or a sound note, for the value of the mere paper is the same for both. Dealers complain about rigorous payment conditions while the manufacturers suffer from the decreasing value of money. During the autumn, the latter diminished during 24 hours 10, 12, 15, 25, 30, 40 and once even 50 per cent. Thus when a bill of 8 million Marks was presented, and the sum was dispatched at once the same day, it arrived on the next, when the amount was worth only 4 millions. If the distance was greater or the bank transactions required several days the amount had diminished much more, hence the general cry for a stable coinage. The average daily loss during October was 23 per cent.

Paper Trade in Austria and Balkan States

With the exception of firms making printing paper, most makers are suffering from dull trade. The German firms undersell, since the Mark is only the millionth part of a Crown, while a year ago it was the same, besides Swedish, Norwegian and Finnish paper has become a competitor again. Many firms founded after the war have closed the doors again. Only during the last autumn Fair in Vienna, some good orders from old and new customers were given and valuable business connections made with Egypt, South America and others.

In the territory which is now Czechoslovakian, the foreign trade is unfavorable. All is available for developing a big paper industry and to supply the eastern nations with paper which are not so blessed. But the export diminishes while the export of woodpulp increases, that of wood even at a rapid rate. It is a careless working and squandering of valuable, national material. The following list shows the remarkable increase. The monthly average export of paperwood was 500 vans, 10,000 kilograms each, per month in 1920; 720 vans in 1921; 4,280 in 1922, and 8,220 during the first quarter of this year. During the summer it reached 10,000 vans or 20 times as much as 3 years ago. During the same period the increase as regards wood pulp was from 180 to 700 vans. As regards paper and paper goods there was a reduction from 560 to 270 vans. The Czech export to the western nations has increased only very little and does not counterbalance the enormous losses in the East.

Switzerland

While the paper consumption is 45 to 46 million kilograms per year, the production of the Swiss firms is 65 millions. The possible productive capacity is twice the consumption, thus the prospects for the makers are not good unless a good export would be possible, which however is handicapped by the high exchange rate of the Franc. The Swiss paper industry has made wrong calculations. When all works are busy at full steam in the coming years, the prices will drop, but if the price per pound of paper drops ½ to 1 franc, there is nothing left for profit. There are at present ten large papermills, four medium sized and 22 small ones. In the whole country are 40 machines for paper and 50 for cardboard in use. The nation is well supplied with waterpower, viz., 2 H. P. per head, but only 720 square yards forest per head. This not being sufficient, wood must be imported.

Dutch Paper Industry Flourishing

The paper industry of The Netherlands has been distinctly prosperous in 1923, says Consul George E. Anderson, in a report to the Department of Commerce. Imports of this commodity have declined and exports have greatly increased. Exports of newsprint during the first nine months of the current year amounted to 21,283 metric tons, compared with 14,244 metric tons in the same period of 1922. Great Britain and Belgium have been the best customers, but 2,059 tons have been shipped to the United States. The export of book paper containing mechanical ground wood is somewhat less than last year, shipments for the first three-quarters of 1923 amounting to only 2,283 metric tons, compared with 2,733 metric tons during the similar period of 1922. This deficiency is made up by exports of the finer grades of the same class of paper, free from groundwood, shipments of which have increased from 7,747 metric tons in 1922 to 10,250 metric tons during the current year. Exports of fine bond and similar papers have also increased, 1923 shipments reaching 3,708

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For many years the preferred piping in Paper and Pulp Mills

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DEEP CUSHION RESILIENT TYPE RUBBER ROLLS

ARE SPRINGY BUT NOT PLASTIC

THEY ARE BUILT LIKE A TIRE

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The Rubber Roll Makers

NEWTON UPPER FALLS, MASS.

HAMILTON BOARD FELTS

Our style No. 82 top felt and style No. 87 bottom felt have the bulk of the filling threads on the face of the fabric. This style of weave causes the felts to give a smoother finish and longer service than can be secured from plain weave board felts besides shedding the water better. They do not "roll on the edge" and are billed at the same list and pound prices as our plain board felts.

SHULER & BENNINGHOFEN
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LOCKPORT Felts

EXCLUSIVE MAKERS OF

Paper Makers' Felts

Have You Run Them?
If Not, Why Not?

Are You Interested in Accurate Running Felts?

Give Us a Trial
Get Authentic Information
Ask the Men Who Run Them

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DRYER FELTS

English Weave in Two, Three, Four, Five and Six Ply—60 Inches to 176 Inches in Width

Fine Faced Felts for Fine Papers. Absolutely no felt marks in paper. TRIUNE Three Ply Felts for Coarse Papers.

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New York

FELTS and JACKETS

Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.

They Satisfy

metric tons, compared with 3,490 metric tons last year. Shipments of strawboard, which, from the export point of view, represents the chief branch of the paper industry, likewise increased, 132,356 metric tons being sent abroad in 1923, compared with 122,091 metric tons during 1922. Great Britain, as usual, was the chief customer. Exports of packing paper have declined somewhat, 1923 shipments amounting to only 7,781 metric tons.

Japanese Paper Mills Escape Quake Damage

The Japanese paper mills entirely escaped damage from the September earthquake, according to T. Seki, secretary of the Association of Japanese Paper Mills, acknowledging a letter of sympathy from Dr. Hugh P. Baker, executive secretary of the American Paper and Pulp Association.

Mr. Seki's letter follows:

"I am in receipt of your kind letter of September 6th extending deep sympathy to the paper industry of Japan. The office building in which we have our headquarters is in a business section remaining undamaged, constituting an oasis, so to speak. This will give you an idea of devastation caused by the earthquake and fire of September 1st.

"You will be pleased to know that not a single paper mill in and near Tokyo was destroyed by fire. All the mills in what may be called the earthquake zone were badly shaken, but they are now all in operation. The Tokyo offices of a few paper companies were burned down, but so far as the manufacturing capacity is concerned, the paper industry is very much better off than many other lines of industries.

"The relief measures taken promptly and efficiently by the American government and people are highly appreciated in this country. Our people are facing the situation bravely, and I am confident that a new city, that will rise within a few years, will be better than the old one in many ways."

A letter recently received from the Oji Paper Manufacturing Company, Ltd., of Tokyo, Japan, states that their office building stood the earthquake of September 1st, but was destroyed by the fire that broke out in the neighborhood. They are now doing business in the Kogyo Club Building of the same city.

News Personals

D. A. Evans, former manager of the Boom and Drives Division of the St. Maurice Paper Company, Ltd., resigned September 30th, and is now with the Newfoundland Power and Paper Company, Corner Brook, N. F., as woods manager. Mr. Evans reports conditions as very satisfactory in Newfoundland. He is now engaged in cutting timber from the floorage of the new dam now under construction.

D. H. Newell Returns to A. W. P. Co.

D. H. Newell, formerly manager of the Philadelphia office of the American Writing Paper Company, and later connected with the sales department of the general office at Holyoke, is again with the big fine paper manufacturing organization.

Mr. Newell, who is well known among paper men, will devote his efforts to selling Eagle-A papeteries especially with the trade formerly served by his predecessor Mr. George Holbrook, who recently resigned.

With this new appointment, the American Writing Paper Company also announces the resumption of the management of its Chicago office by A. N. Forsythe, who successfully held that position for many years.

Alexander Smith, New Abitibi President

At a meeting of directors of the Abitibi Power and Paper Company, Ltd., of Iroquois Falls, Ontario, held November 9, Alexander Smith, of Chicago, was elected president of the company, replacing the late F. H. Anson.

W. A. Black, vice-president and managing director of the Ogilvie Flour Mills Company, Ltd., was elected vice-president of the company, of which he had been a director for many years. E. L. Pease, vice-president of the Royal Bank of Canada, was elected a director, while L. R. Wilson, formerly secretary of the company, was appointed general manager.

Harry H. Philcox

Prominently identified with the paper trade in New York City for more than a quarter of a century, and vice-president of the H. P. Andrews Paper Company, of 104 Worth St., New York, Harry H. Philcox died at his home in Maplewood, N. J., on November 17, of pneumonia. Mr. Philcox was 47 years old, and started his career at the age of 14 as a stock

Walter G. Morey

Morey Paper Mill Supply Co.

Manufacturers' Agents

99 Chauncy St., Boston, Mass.

Specializing in

Canvas Dryer Felts

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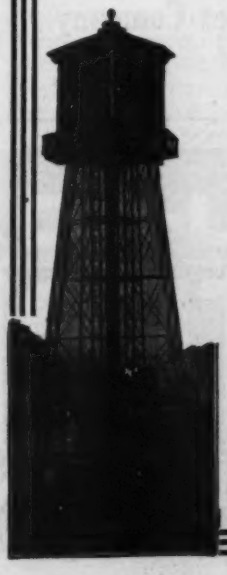
Generosity typifies the design and construction of Caldwell Structural Towers. To provide the strength and sturdiness that have marked the unusual success of this type of tower for heavy loads and great heights we have spared no precaution in material or workmanship.

This tower is built of heavy structural shapes thoroughly laced and riveted together by the most modern scientific engineering methods. It is built for steel or wood tanks in capacities from 15,000 gallons upward.



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Incorporated
2570 Brook St.,
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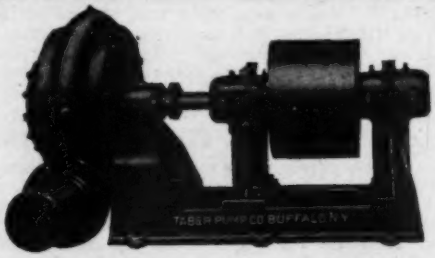
Caldwell TANKS AND TOWERS

Pickles' Patent
Automatic Steam Regulator
FOR
Paper Making Machines

Which absolutely control the drying of the sheet. Installed on sixty days' trial

W. F. PICKLES **Buckland, Conn.**

Another Massive TABER CENTRIFUGAL PUMP



TABER PUMP CO., **Buffalo, N. Y.**
"Pump Specialists"
Builders of Centrifugal and Rotary Pumps

20 Per Cent Saving in Steam Guaranteed

The STICKLE COMPOUND CONDENSING SYSTEM and AUTOMATIC STEAM CONTROL for Paper Machines is **guaranteed** to save you 20 per cent in steam consumed for this purpose.

Our folder entitled "How to Dry Paper"—showing our Compound Condensing System for draining the dryers and heating the air with the discharge from the dryers to condition the machine room should interest you.

Send for this folder to-day

Stickle Steam Specialties Company
Indianapolis, Ind.
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DON'T SPEND A NICKEL
on your power plant until you have investigated
The Cole System
of handling Steam Condensation

For Storage Heaters, Drying Coils, Pumps and Power Plant Specialties Write

THE GRANT E. COLE COMPANY
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WE-FU-GO AND SCAIFE
WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.

boy with Coy, Hunt & Company, Inc., paper dealers in New York, and later went with George W. Millar & Company, Inc., paper merchants in the same city. He was one of the incorporators of the H. P. Andrews Paper Company. A widow and two sons survive.

Jesse Harper

One of the best known members of the paper stock trade in New York City died in the Beekman Street Hospital in that city on November 19, following a stroke of apoplexy. Mr. Harper was 64 years old, and for 20 years had been with the firm of Darmstadt, Scott & Courtney, packers of paper stock at 178 South St., New York, prior to which time he was with the Maurice O'Meara Company. Mr. Harper is survived by a widow and a daughter.

After an absence of a year and a half, owing to ill health, William J. Robertson has again joined the executive staff of the Heller & Merz Company, as assistant to the treasurer, Eugene Merz. Mr. Robertson has fully recovered and will devote his attention to the buying and selling end of the business, making his headquarters at the New York office, 503 Hudson St.

Mr. E. E. Keough has returned from an extended business trip to the Pacific Coast in the interest of the American Writing Paper Company, and will continue his work as Manager of the Advertising Department of that company, working in close conjunction with the newly created Department of Sales Promotion, which is in charge of Mr. Fred Webster.

Frank C. Overton, of Castle & Overton, importers of and dealers in paper mill supplies, of 200 Fifth Ave., New York, returned on December 1 from an extensive tour of Europe, which lasted nearly two months. Mr. Overton was accompanied abroad by Mrs. Overton, and his trip was primarily for pleasure.

Harry Rosenberg, formerly with the Emanuel Salomon Corporation, of New York, has opened an office at 145 Nassau St., New York, to deal in paper mill supplies and to represent the firm of L. Sher & Sons, Inc., packers of hosiery and underwear clips of Reading, Pa.

William H. Donaldson, Jr., formerly with the Bermingham & Prosser Company, of Kalamazoo, Mich., is again associated with his father in the firm of Howell-Donaldson, Inc., wood pulp importers and dealers of 50 East Forty-second St., New York.

Frank E. Dunaway, formerly sales manager of the Becker Woodpulp Company of America, Inc., 501 Fifth Ave., New York, is now associated with the Woodpulp Trading Company, wood pulp importers and dealers of 501 Fifth Ave., New York.

The Penn Yan Board & Paper Company, of Penn Yan, N. Y., has announced the appointment of A. L. Montgomery as superintendent. Mr. Montgomery was formerly superintendent of the Halltown Paper Board Company, of Halltown, W. Va.

George D. Bierce, engineer for the News Print Service Bureau, with headquarters in New York, made a three weeks' trip through the mills in the Lake states during November.

At a recent meeting of the board of directors of the International Paper Company, Owen Shepherd, treasurer of the company, was elected a member of the board.

Lewis H. Nash

The death of the president of the Nash Engineering Company, Lewis Hallock Nash, occurred Saturday, November 17.

A petition in bankruptcy was filed on November 15 against the Freedom Paper Company, Inc., paper jobbers of 121 Sullivan St., New York City, by the Rushmore Paper Mills, Inc., creditor for $1,000; the Paper Utilities Company, Inc., $1,000, and Hyman Jacobs, $2,500. Judge Hand appointed James S. Wemyss receiver under $10,000 bond. Liabilities were stated to be about $90,000 and assets about $70,000.

The Waterproof Paper Products Corporation, of Herkimer, N. Y., has filed notice of an increase in capitalization from $50,000 to $100,000.

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

Hungerford & Terry, Inc.
CLAYTON, N. J.

Water Softening and Filtration

Paige-Jones Products include the known successful commercial methods for boiler water purification, permitting correct internal or external treatment as the individual case demands.

Paige-Jones Pressure Filters insure a clean and clear water for all industrial purposes.

Write today for descriptive literature.

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PAPER MAKING **MACHINERY** PAPER CUTTING

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THE
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ESTABLISHED 1828
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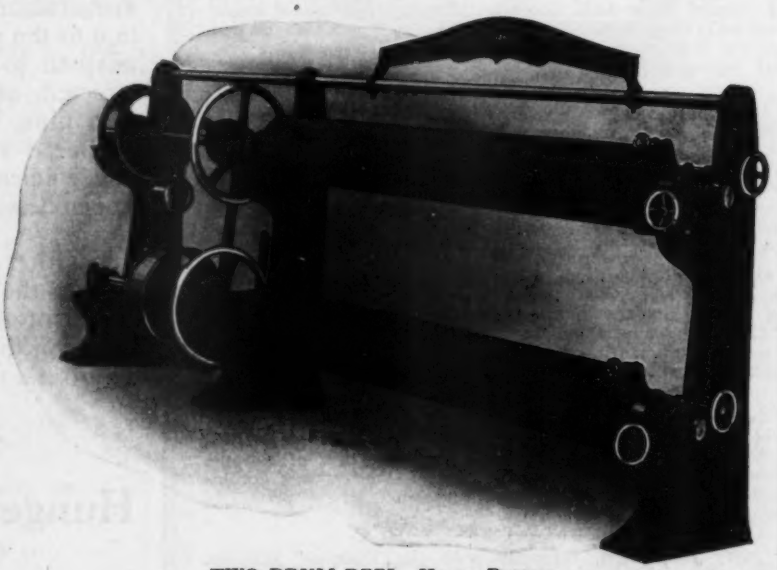
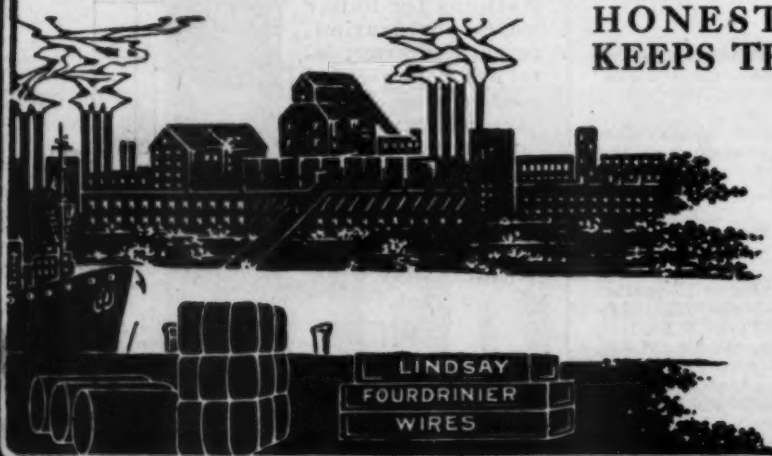


TWO DRUM REEL—Heavy Pattern

Real Merit Placed

Lindsay Fourdrinier Wires

In Many Mills



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KEEPS THEM THERE

They are ready to serve you

The Lindsay Wire Weaving Company

Collinwood Sta., Cleveland, Ohio

"Ask any Papermaker"

Timber Cutting in California

The best methods of harvesting national forest timber in the Sierra forests of California is the subject of Department Bulletin, No. 1176, just issued by the United States Department of Agriculture, entitled, "Some Results of Cutting in the Sierra Forests of California."

As in other forms of agriculture, the best soils and most favorable climates result in the most rapid growth, and the poorer the soils and the more unfavorable the other growing conditions, the poorer response the trees make. Especially is this so after the removal of the older trees, for the seed trees left do not grow as rapidly, new growth takes longer to become established, and the length of time required to produce a new crop for harvesting is prolonged.

In the California pine forests, new seedlings become established in about five years under good growing conditions, while on the poorer lands as high as twenty years may be required before the area is again stocked, and it is quite possible that the distribution of the seedlings will not be uniform, according to the bulletin. When the forest is logged, as many of the young trees on the ground should be saved from destruction as is possible, as this advance growth saves time in waiting for new seedlings, and usually grows very rapidly after the older forest has been removed.

On all the sales of national forest timber, seed trees are left to provide for the new forest. Trees left for this purpose in the pine forests of California should be the thrifty ones with a diameter over 18 inches, as under that diameter the seed produced is usually insufficient to stock up the area. Best results have followed when the trees are well distributed over the ground, for when in groups they do not grow so rapidly and the resulting stand is not uniform. Very large trees are often too old to make any more volume growth, and are often attacked by insects or disease, are often blown over by the wind, while very small trees do not furnish sufficient seed.

Because of the rather haphazard conditions in these forests, which are usually several centuries old, the forester cannot have definite rules for marking the timber. He must use his own initiative and his knowledge of the principles which govern all growth, whether farm or forest. Each acre in the woods is a problem by itself, and to get the best possible forest in the shortest possible time is a task which calls for good judgment and care.

This bulletin, which is free, as long as the supply lasts, may be secured by writing to the District Forester, San Francisco, Calif., or to the United States Department of Agriculture, Washington, D. C.

The A. P. W. Paper Co. of Albany, N. Y., has acquired a large tract of property in the vicinity of Sheet Harbor, near Halifax, N. S., heretofore held by the Sheet Harbor Lumber Co., and plans the construction of a new local pulp mill to cost approximately $250,000, including equipment. It is proposed to develop an initial output of about 25,000 cords of pulpwood per month, giving employment to more than 200 operatives. The majority of equipment will be electrically operated.

It is announced that the Shenandoah Boxboard Corp., recently organized by Coshocton, Ohio, interests, will take over and operate the plant of the Old Dominion Paper Co., of Winchester, Va. Plans for extensive improvements are now being made, and when completed, the company will engage in the manufacture of cartons and kindred products. Nathan H. Carpenter is president of the corporation.

The recently organized plant of the Saranac Pulp & Paper Co., of Plattsburg, N. Y., has taken over the former local plant of the Lozier Automobile Co., for the establishment of a new paper mill. The structure will be remodeled and improved, and equipment installed at an early date. H. P. G. Nostrand, formerly connected with the Stevens & Thompson Paper Co., Greenwich, N. Y., is general manager.

The Bishopic Co., of Cincinnati, Ohio, manufacturers of composition board, wall board, etc., will erect a one-story plant, 150x230 feet, and a one-story power house, 38x45 feet, at Los Angeles, Calif. The W. G. Holcomb Co. are the contractors, and Noice & Merrill are engineers. Both companies are of Los Angeles.

The Deerfield Valley Paper Company will abandon their pulp mill at Mountain Mills, Vt., in February.

The St. Regis Paper Co., of Watertown, N. Y., will erect a new $500,000 plant, consisting of a number of units.

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Fourdrinier Wires
Cylinder and Washer Wires

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WE ALSO MANUFACTURE

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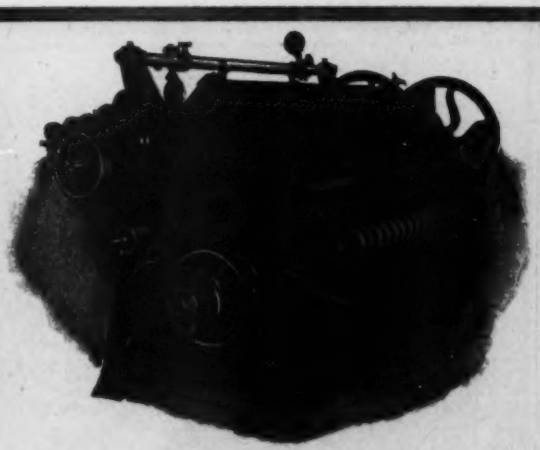

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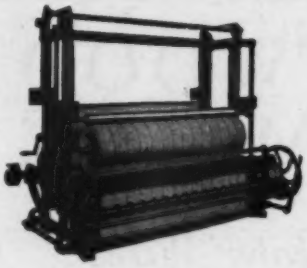

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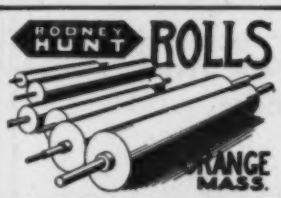

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Steel Transmission Towers

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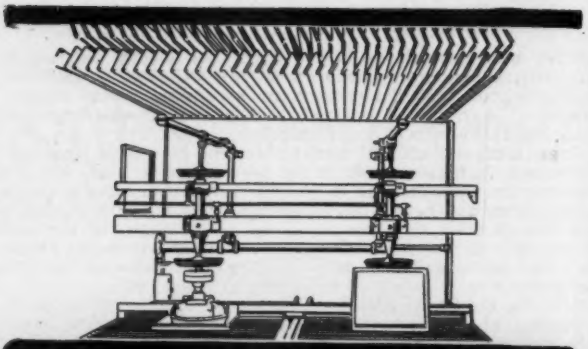

A Non-Clogging Air Washer with Tandem Atomizer.

The illustration above shows top view of the atomizer chamber of a

Bayley Turbo Air Washer

The four motor operated sprayer discs create a very dense double spray of infinitesimal particles of water, through which air must pass before it enters the room. In this passage through the screen solids, dust, soot and other impurities are removed from the air, leaving it pure and sweet as after shower breezes. As a conditioning unit it will keep temperature and humidity uniform throughout the year, regardless of weather conditions. Unique construction of the atomizers keeps the water spray uniform in density and clogging is entirely eliminated. Especially designed for churches, schools, theatres, food producing establishments, hotels, public and office buildings.

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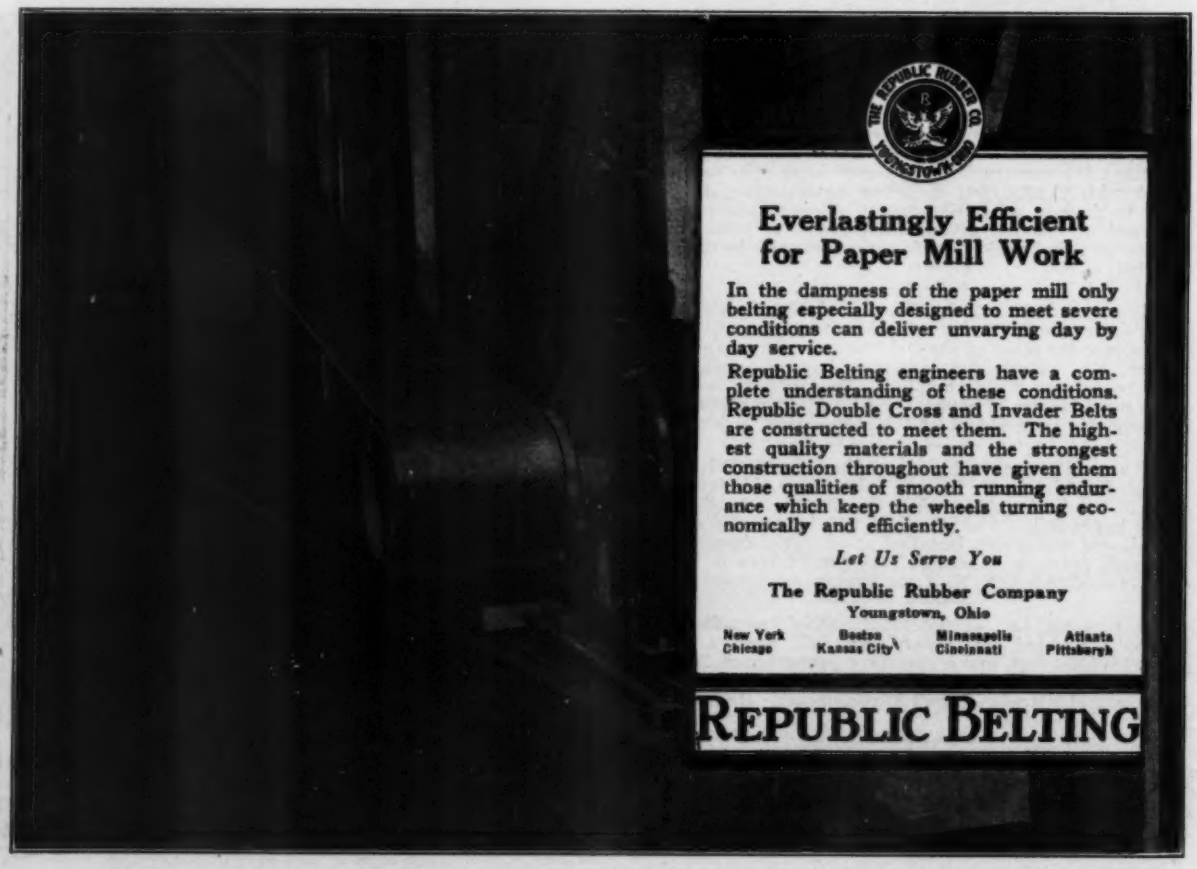

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Everlastingly Efficient for Paper Mill Work

In the dampness of the paper mill only belting especially designed to meet severe conditions can deliver unvarying day by day service.

Republic Belting engineers have a complete understanding of these conditions. Republic Double Cross and Invader Belts are constructed to meet them. The highest quality materials and the strongest construction throughout have given them those qualities of smooth running endurance which keep the wheels turning economically and efficiently.

Let Us Serve You

The Republic Rubber Company
Youngstown, Ohio

New York Chicago Boston Kansas City Minneapolis Cincinnati Atlanta Pittsburgh

REPUBLIC BELTING

Pulpwood and Wood Pulp in North America

What we believe to be one of the most helpful books of the year, written for the interest of the pulp and paper industry, has just been published by the McGraw-Hill Book Company, Inc., of New York City. The title of this book is "Pulpwood and Wood Pulp in North America," by Royal S. Kellogg, secretary-treasurer of the Newsprint Service Bureau. No introduction is needed to the author, as he has been a well known figure in the paper and lumber industries for years. Added value might be given to this work if we say here that Mr. Kellogg can be safely quoted as an authority on forestry. His extensive study of forestry as related to the pulp and paper industry has given him the distinction of being one of the leaders of the great reforestation movement, which is now making strong headway.

The book has an excellent physical appearance. Bound in dark green cloth, with gold lettering, it makes a distinctive showing when placed on the library shelf. The size is 6"x9" and the contents covers 288 pages.

A few of the chapters are here listed: Chapter 3—Consumption of Wood Pulp in North America; Chapter 6—Pulpwood Grades; Chapter 7—Pulpwood Used in North America; Chapter 8—Properties of American Pulpwoods; Chapter 9—Forest Regions; Chapter 11—Forest Ownership; Chapter 14—The Methods of Forestry; Chapter 16—The Cost of Forestry; Chapter 18—What Should Be Done. The appendix covers 44 pages of statistical data, etc. There are in all, 87 illustrations and charts. In Chapter 8, Mr. Kellogg gives a complete list of the American pulpwoods and their properties.

This book should put the reader in closer touch with this great problem of reforestation—what has already been done in the different sections of North America to insure our future forest and what is contemplated being done, by national and private interests in the United States and Canada. The price of this book is $4.00 per copy.

Dept. of Commerce Issues Commerce Yearbook

The Commerce Yearbook for 1922, including the early part of 1923, has just been published by the Department of Commerce. This book has been prepared by the Bureau of Foreign and Domestic Commerce, with the co-operation of the Bureau of the Census, in response to the demands of American business men, bankers, economists, trade association executives, and the trade press for an authoritative review of the economic year throughout the world, prepared from the point of view of American industry and commerce.

The outstanding facts of trade, production, price changes, and market conditions are analyzed. Summaries are included in the principal manufacturing, mining, and forestry industries, of agriculture, construction, transportation, communication, finance, prices, and domestic and foreign trade of the United States, with reviews of the commercial and industrial developments in the principal foreign countries.

In the section devoted to the pulp and paper industry, a summary is given of the year's progress in relation to other years, in foreign trade, market conditions and production. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price per copy is 60 cents.

Considerable Interest Shown in Regulator System

The Minnesota and Ontario Paper Company have installed two consistency regulators for metering slush stock, which are manufactured by the Trimbey Machine Works, of Glens Falls, N. Y. They are pleased with this installation, and report that weights and quality of paper were never better than they are now, since installing these regulators. The company is preparing to install a system in the Insulite plant at International Falls.

Great interest in the system is being shown in England, Norway, Sweden, Finland and Japan.

Carthage to Manufacture Bag-Making Machinery

The Carthage Machine Company, of Carthage, N. Y., who have been manufacturing pulp and paper mill machinery for a number of years, have recently arranged for the manufacture of all lines of bag-making machinery.

These machines will be manufactured under patents and patent applications developed by Mr. A. C. Coty, who has had a broad experience in the bag industry. Mr. Coty will be associated with the above concern in the manufacture of this line of equipment, having severed his connection with the Watertown Bag Machine Company.

Preparing for 1924 Exposition

The Paper Industries Exposition has reserved the entire first floor of the Grand Central Palace for its 1924 exhibition, and has made tentative reservation of the mezzanine floor in addition, if the number of exhibitors warrants this expansion of the paper show, which will be held the week beginning April 7th, 1924.

The success of the first exposition, held in April, 1923, was such that the change to first floor space, with its greater facilities for showing and viewing exhibits, was justified. Already there have been contracts for space received from the 123 of those who exhibited in the 1923 exhibition.

Connection sought by Sulphite and Sulphate Pulp Mill Chemist. Thoroughly experienced in paper-mill chemistry and a practical paper-maker. Address Box 60, The Paper Industry.

For Sale

One 1-Cylinder Moore & White Tissue Machine, having a trim of 76"; three 40 H. P. Fitchburg Steam Engines; three Noble & Wood 1,000 lb, Beating Engines; one Smith & Winchester 63" Undercut Paper Cutting Machine.

This equipment is all in very good condition, and in the case of the Cylinder Papermaking Machine, same can be seen in operation.

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INDUSTRIAL—AGRICULTURAL—MUNICIPAL—RESIDENTIAL

A Type for Every Service

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CRESCENT BELT FASTENERS

They Insure Full Power Transmission

They Sustain the Belt's Full Strength

They Make Good Belts give Better Service

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Digester, Acid Proof and other Guaranteed Linings
Chemical Pulp Mill Engineers

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Sturtevant Drying Systems
You can remove damp steam as it forms; prevent roof drips; dry sheets evenly; reduce felt and press roll crowning bills; and increase production and profit by installing a Sturtevant System.
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Complete Pulp & Paper Mills, Investigation of New Enterprises, Special Heat & Power Applications, Hydro-Electric Developments, Steam-Electric Power Systems, Sectionalized Paper Machine Drives.
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STEAM PLANTS
Examinations
Reports
Estimates of Cost
Designs
Specifications
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New York, December 1, 1923.

WITH the close of the year and the inventory period but a month away, there is a natural tendency among consumers of paper to limit their current buying to quantities sufficient to cover immediate requirements. The same thing applies to paper jobbers. There is consequently a rather restricted call for supplies of many kinds of paper; on the other hand, certain papers are moving in record-breaking tonnage, and it can be stated that the big demand for some descriptions of paper more than offsets the limited call for others insofar as volume is concerned.

The market in a good many ways has been a disappointment to manufacturers during the past two months, however. Ordinarily October and November are two of the busiest months in the year for the paper industry; this is the time when consumers are preparing for the pre-holiday season and they purchase in heavy volume, particularly of those kinds of paper chiefly affected by pre-Christmas retail activity. Demand for paper failed to develop in the tonnage anticipated this year. The reason for this is rather difficult to explain. Every indication seems to point to a tremendous holiday trade this season, and why paper has not moved in as large quantities as manufacturers and merchants were led to expect is somewhat of a puzzle.

It would appear that demand for paper recently has been greater than those within the industry have been able to comprehend. The fact that the paper mills of the country have expanded to a point where it is necessary for boom conditions to prevail before there is sufficient business to go around and give every paper manufacturer work enough to warrant full production doubtless has been overlooked in numerous quarters, and paper producers and distributors have been wont to describe the market as rather quiet notwithstanding that statistics would go to prove that manufacturing operations have been on a comparatively broad scale and that the movement into consuming channels—when all kinds of paper are taken into consideration—has very nearly equaled that of any period of activity in the past.

At the same time demand admittedly has been more or less one-sided. Newsprint has been wanted and is still wanted in tonnage exceeding anything the industry has ever witnessed heretofore in this connection. Bag papers have been in excellent demand, and so have building papers of all kinds. There has been much room for improvement in the markets for book paper, fine, wrapping and tissue papers and box boards, however. Consumers of these latter grades have been extremely cautious in their buying; orders have been confined mainly to hand-to-mouth quantities, and little or no supply has been absorbed for stock. This has been creative of a good deal of competition among manufacturers, who have exerted every effort to secure as large a part of the available business as possible, which, together with the competition of foreign paper, has made for much irregularity in prices and resulted in some easiness in quotations.

That activity in the industry is on a fairly broad scale is indicated by the monthly summary of production, shipments and stocks of paper mills of the United States issued by the American Paper and Pulp Association, which shows that production and shipments of practically every kind of paper increased appreciably during October over September. For example, production of newsprint in October was 7 per cent above the preceding month, that of book paper 12 per cent greater; of bag paper, 35 per cent larger; of felts and building papers, 24 per cent; of wrapping, 10 per cent; of hanging, 22 per cent; of fine paper, 8 per cent; and of paper board, 16 per cent. Shipments increased in like proportion, while mill stocks in almost every instance showed a marked decline during October, showing that manufacturers shipped out not only all of their current production but also a good part of their surplus stocks.

The outlook for the industry is most promising. For a time there was a distinct aversion exhibited by those in a position to anticipate to express an opinion regarding prospects for business in 1924. Lately, however, bankers, economists, manufacturers and merchants have come forward with expressions of confidence over the new year. There is a well-defined belief that the country will experience excellent business in various lines during the first half of 1924 at least, and it stands to reason that if business generally is good the paper industry will get its full measure of activity as paper is so dependent on most all other commodities. The paper industry—and the manufacturing branch in particular—should enjoy activity if for no other reason than that stocks of paper of virtually every description are unusually small at present. It is well established that jobbers are carrying far less stock than they ordinarily do, that consumers have purposely kept their stocks down to as low a level as their requirements would permit, and that manufacturers have wisely gauged production by the demands made on them for supplies from consuming and distributing sources. This in itself attests to the healthiness of the prevailing situation, and should certainly mean that mills can continue to operate on at least the scale of the past few months with every prospect of a further expansion of demand necessitating increased output.

In this connection it is interesting to note that newspaper publishers, in arranging contracts for newsprint deliveries over the first part of the new year, are ordering appreciably larger tonnage than in the current year. Leading newsprint manufacturers, including the International Paper Company, have announced that no change will be made in the present price of 3.75 cents a pound or $75 per ton f. o. b. mills for standard news in rolls will be made over the first six months of 1924. The maintenance of this price basis in the face of expectations of an advance in numerous quarters has instilled confidence in publishers and they are freely covering their anticipated requirements and are contracting on a much bigger scale than a year ago. This, on top of the greatest year in point of consumption the newsprint industry has ever known, would indicate that the coming year is going to be a most prosperous one for the entire paper industry.

Newsprint is in a very strong market position. Demand has increased recently, rather than showing abatement, and consumption at the moment is probably at the highest level the country has ever known. Publishers are being literally deluged with advertisements from department stores and other merchants who are advertising their holiday wares, and there is scarcely a newspaper in any of the large cities which is not obliged to omit advertisements from nearly every issue because of lack of space. Statistics show that all records of production and consumption have thus far been exceeded this year, and 1923 will likely go down in the annals of the print paper industry as a period for manufacturers to aim at in the future.

Book paper is fairly active. Not all of the mills are running at capacity but demand is of a very consistent character, and prices display more steadiness than in some time. Fine papers have improved their position. The movement into consuming channels has increased and quotations are firm and inclining higher. Coarse papers, wrapping especially, have suffered from foreign competition, but domestic producers are managing to keep passably busy. Building papers have been exceedingly active though at the moment there is a seasonable lull, while demand for bag papers is very brisk and mills making this class of paper are rushed and are behind in deliveries.

Pre-holiday business in box boards has been disappointing. Demand has developed slowly, with consumers buying only against immediate needs and apparently not requiring as much board as ordinarily, which, coupled with a sharp drop in raw material, caused prices of board to recede to where sales were recorded down to 45 a ton and even less delivered New York for plain chip, and $47.50 a ton for filled news board. Most manufacturers are now quoting a little in excess of these prices.

Petition has been filed by Frank M. McKey, a trustee of the American Straw Board Company, which has been in bankruptcy since July 1, 1919, to authorize him to sell their plant at Wilmington, Ill., at public or private sale. The property is to be sold free of incumbrances and the proceeds of the sale are to be applied towards all the outstanding debts.

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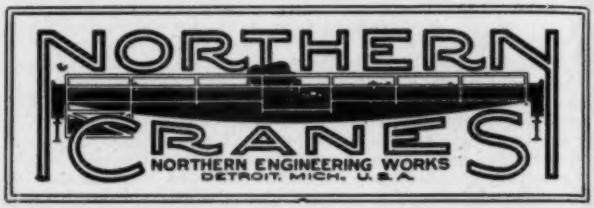
Write for Handbook of Conveyor Practice

ROBINS CONVEYING BELT COMPANY

New York Chicago Pittsburgh Boston



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Paper Makers Chemical Company

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Standard Quality
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The Casein Manufacturing Company

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QUANTITY AND QUALITY

To assure quantity production and uniform quality the raw materials of paper manufacture must be constant in supply and uniform in quality.

Diamond Tested Alkalies are produced in the most modern alkali plants in the world, where quality is the first consideration. Diamond Soda Ash and Diamond Caustic Soda, because of their uniform high quality, are particularly adapted to the requirements of paper manufacture.

The location of the Diamond plants at Painesville, Ohio, where they are directly served by three trunk line railroads, assures a constant supply of these materials.

Manufactured and Sold by

DIAMOND ALKALI COMPANY

PITTSBURGH, PENNSYLVANIA

Paper Making Rags

There is an undertone of firmness in the papermaking rag market. This is not unusual at this time of the year, and at the moment the firmness is quite pronounced, due to several factors which seem likely to make for a stronger market as the winter progresses. Current business in rag stock is nothing out of the ordinary in point of volume. There is a fairly steady movement toward mills but it is very noticeable that paper manufacturers are buying cautiously, and chiefly to cover their direct wants which is the customary procedure with the end of the year and the inventory period only a month away. As a matter of fact, the strengthening factors lie at the supply end of the market but they are of sufficient importance to be creative of firmness in spite of the comparative limited demand from consuming quarters.

The general labor situation throughout the country is having much influence on the rag situation. With wages for common labor high, due to a more or less scarcity of this class of labor, it stands to reason that a good many men who formerly realized a livelihood collecting rags and other waste materials have forsaken this industry for more lucrative forms of employment. This obviously has reduced collections of rags, while collectors who remain in the industry are insistent that they receive at least a certain return for their rags so as to bring their remuneration up to a relative level with similar kinds of employment. This makes for rather high prices at the source of supply, and rag values consequently are proportionately high all along the line until they reach the consuming plant.

Another sustaining factor is the situation abroad. There is apparently little doubt that fewer rags are available in Europe at the present time than has been the case in a good many months. European dealers have shipped tremendous quantities to the United States this year and stocks abroad are reported on a low level. This prompts sellers in Europe to adopt a bullish attitude, particularly with the winter here, and fairly stiff prices prevail on the other side of the Atlantic, with the result importers in the United States are obliged to secure certain rates from paper mills in order to import supplies at a profit. Added to these factors is the small stocks in dealers' and consumers' hands in this country. Paper manufacturers have been purchasing in such a reserved manner in recent months that dealers are prone to believe mill stocks are unusually light; there are plenty of indications of this being true, and it is a hard matter to convince dealers or importers that otherwise is the case in the instances where consumers are fairly well fixed with supplies. Dealers and packers in a majority of cases are carrying small stocks because financial conditions and the cost of rags are such as to compel them to.

There has been no broad change in prices during the past month. The tendency, however, has been upward in most grades of rags. Demand from consumers other than papermakers has doubtless been proportionately greater than from paper mills for the reason that with cotton on such high price levels manufacturers of shoddy, shredded materials and other cotton rag products have experienced an excellent call for their goods and have consequently purchased rags in good volume. This has had the effect of stiffening prices on some kinds of new cuttings in particular and has also firmed quotations on some grades of old rags.

Most members of the trade look for an advancing market in papermaking rags soon after the turn of the year. Dealers and packers are especially confident regarding roofing rags. The building program for 1924 provides for even greater construction operations than in the current year, and it is expected manufacturers of roofing felt and building papers will come actively into the market for rags shortly after the inventory period early in January. It is argued that consumers in this country will not have as large supplies in Europe to draw on next year as they had this year, and it is also contended there is small probability of domestic collections increasing unless prices should rise to levels which would attract more men into the industry. This accounts in large measure for the firm market position of low-grade rags at present, as dealers are hesitant about entering heavy commitments and are mostly confining their sales to rags immediately at hand.

No. 1 roofing stock is selling in the East at about 1.40 cents per pound f. o. b. shipping points, and No. 2 packing at 1.30 cents, while in the West slightly higher prices prevail, the western market being approximately $2 to $3 per ton above the East. Foreign dark cottons are firm at 1.40 to 1.50 cents a pound ex dock New York, and importers do not appear anxious about accepting orders involving sizable lots at these rates, evidently figuring that they will be able to secure higher prices later on.

Old white rags are firm at from 6.75 cents a pound upward on No. 1 repacked at shipping points, and from 4 to 4.50 cents for No. 2 repacked. Importations of white rags recently have been small and it is stated that available supplies of such rags in Europe are subnormally small. Repacked thirds and blues are bringing 3 cents and higher at dealers' points, depending on the quality of packing, while rough blues are quoted at 2.40 to 2.60 cents per pound. Old cotton batting is a firm item, due to the high price of raw cotton, and has sold to consumers at 6.50 cents a pound at shipping points.

In new cuttings, there is an especially strong price tone in a few grades. Blue overall cuttings are quoted at 8.25 cents and higher per pound at dealers' points, unbleached muslins at 11.50 cents, No. 1 washables at 5.25 to 5.50 cents, and bleached canton flannels at 10.75 cents. White shirt cuttings have advanced slightly to where dealers ask 13 cents a pound for No. 1 packing, while fancy shirt cuttings are quoted at 6.50 cents.

Average quotations f. o. b. shipping points and ex dock are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	13.00-13.50
White shirt cuttings, No. 2	6.25- 6.50
Fancy shirt cuttings	6.25- 6.50
Washables, No. 1	5.25- 5.50
Unbleached muslins	11.25-11.50
White lawns	11.00-11.25
Overall cuttings, blue	8.25- 8.50
Black silesias	4.75- 5.00
Light flannelettes	9.75-10.00
Canton flannels, bleached	10.75-11.00
Canton flannels, unbleached	10.00-10.25
Shoe cuttings, bleached	9.50- 9.75
Shoe cuttings, unbleached	8.00- 8.25
Light silesias	8.00- 8.25
O. D. khaki cuttings	4.25- 4.50
Mixed khaki cuttings	4.00- 4.25
Corduroy cuttings	3.75- 4.00
Cottonade cuttings	3.75- 4.00
Linens, No. 1 white, foreign	14.50-15.50
Light prints, foreign	5.25- 5.50
Old Stock—	
Whites, No. 1, repacked	6.75- 7.50
Whites, No. 2, repacked	4.00- 4.50
Whites, house soiled	3.00- 3.25
Whites, street soiled	2.75- 3.00
Lace curtains	4.00- 4.25
Thirds and blues, rough	2.40- 2.60
Thirds and blues, repacked	3.00- 3.25
Black stockings	3.50- 3.75
Cotton canvas, No. 1	4.25- 4.50
White cotton batting	6.25- 6.50
Roofing, No. 1	1.40- 1.60
Roofing, No. 2	1.30- 1.45
Dark colored cottons, foreign	1.40- 1.50
Blue linens, foreign	4.00- 4.50
Gray linens, foreign	6.00- 6.50
White linens, foreign	10.00-10.50
Light prints, foreign	3.25- 3.50

Rope and Bagging

Probably of all the various raw materials consumed by paper mills, old manila rope is at the moment in the strongest market position. Demand for this article has continued steady and of fairly broad dimensions, and prices have grad-

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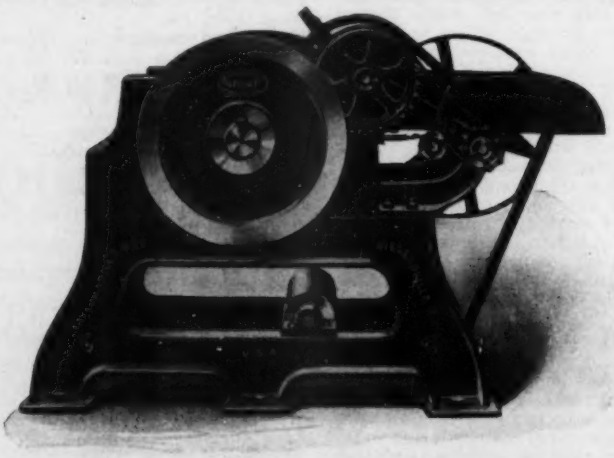

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ually though consistently crept higher until sales of No. 1 domestic manila rope have been recorded at 7.25 cents a pound f. o. b. shipping points. Foreign rope is relatively as high, around 6.50 cents or a trifle higher being the prevailing market level of No. 1 imported rope.

The position of old rope reflects the activity at bag paper mills, and also the diminished activity in the shipping trades and the consequent reduction of old rope production. Dealers assert that they are having unusual difficulty in locating sizable quantities of old manila rope, particularly in domestic quarters, and this is one commodity where the imported article does not compare favorably in quality with the domestic material. For a time several weeks ago there was literally a scramble among consumers to secure old rope and demand has subsided but slightly since. Strings are in routine call but prices show little change, demand being of a character failing to affect values.

There is apparently a plentiful supply of old bagging, and prices merely are holding their own or else, in the case of certain grades, have eased off a trifle. No. 1 scrap bagging is quoted at about 1.25 cents a pound at shipping points, with special packing bringing an eighth of a cent more, while roofing bagging sells at 80 to 90 cents a hundred pounds at dealers' shipping points. Old gunny bagging is quotably steady and in fair demand.

F. o. b. shipping point quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.25-1.35
Gunny, No. 1 foreign	1.15-1.25
Scrap bagging, No. 1	1.15-1.25
Roofing bagging	.80- .90
Wool tares, heavy	1.50-1.65
Wool tares, light	1.40-1.50
Manila rope, No. 1, foreign	6.25-6.50
Manila rope, No. 1, domestic	7.00-7.25
Sisal strings	2.15-2.35
Mixed strings	1.00-1.25

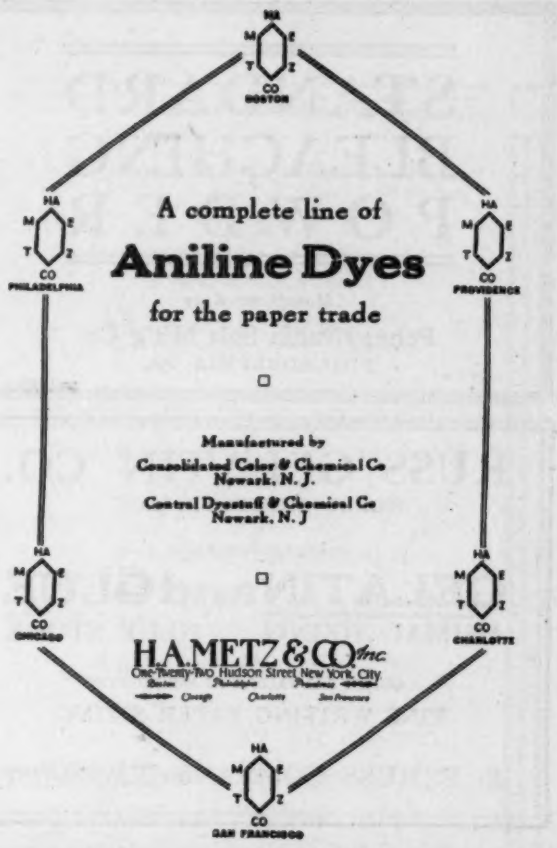
Old Paper

After declining to levels which most members of the trade had believed were well nigh impossible under ruling circumstances, prices of old paper have reacted and the tendency of the market is in a higher direction. The movement of prices during the past month was surprising indeed. November usually is a busy period for the waste paper trade since board mills ordinarily are actively engaged at that time turning out their product for the pre-holiday trade and therefore consuming large tonnage of old paper, but board business developed slowly during the busy season this year and, with demand of little importance, waste paper prices sunk to low points. For example, No. 1 mixed paper declined in the East to where sales at $9 per ton f. o. b. New York were made; folded news, old magazines, manilas and other grades moving down in similar proportion. Since then, however, prices have improved their position, due more to conditions that arose at the supply end resulting from curtailment of collections and a reduced available supply than to any broad increase in demand from consuming quarters.

No. 1 mixed paper is selling in Chicago at one cent per pound f. o. b. this city, while in the East prices of this grade range from 60 cents a hundred pounds upward at shipping points. Old folded newspapers are quoted at 1.05 cents a pound in the West and 85 cents a hundred pounds in the East. Heavy No. 1 book stock is selling at 1.50 to 1.75 cents a pound at shipping points, with slightly higher prices paid by mills for special packing, while ledger stock is bringing around 2 cents per pound. A firm item is old No. 1 kraft paper, which freely commands 2.15 cents and higher at shipping points, and white blank news has sold at 2.20 cents per pound f. o. b. dealers' points. Shavings are quoted at an average of 3.90 cents a pound for No. 1 hard white, and 3.10 cents for No. 1 soft white shavings.

F. o. b. shipping point quotations are:

	New York and Chicago
Hard white shavings, No. 1	3.80-4.00
Hard white shavings, No. 2	3.25-3.50
Soft white shavings	3.00-3.25
Colored shavings	1.75-2.00
Heavy book, No. 1	1.50-1.75
Crumpled book, No. 1	1.25-1.40
Ledger stock	2.00-2.15
Kraft, No. 1	2.15-2.25
Manilas, No. 1	1.25-1.50
White blank news	2.20-2.30
Over-issue news, No. 1	1.10-1.25
Folded news	.85-1.05
Mill wrappings	.90-1.00



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"Distinguished for their High Test and Uniform Quality"

Mixed paper, No. 1	.60-1.00
Common paper	.40- .50

Chemical Pulp

An unsettled condition still exists in chemical wood pulp. Producers generally are quoting unchanged prices but prices mean little or nothing at present as sellers are literally slashing quoted rates in an effort to secure all the business to be had and to wean away orders from competitors. The whole truth of the matter is that demand is slow. Importers have brought in large amounts of pulp in recent months, and this has obviously diminished demand for the domestic product; moreover, most consumers have been buying on a strict hand-to-mouth scale so that the consuming outlet has not been wide enough to absorb all of the pulp manufacturers have had to sell in spite of curtailed production. With the winter progressing and a likelihood that freezing weather will further reduce the output, a firmer tone seems to be developing but there has been no change in prices in an upward direction; on the contrary, any alteration has been downward.

Leading producers continue to quote No. 1 bleached sulphite at 4 cents per pound f. o. b. pulp mills and 4.50 cents for the special quality grade, but it is stated that sales have been made far under these rates. Unbleached sulphite is said to have sold down to 2.60 cents a pound at pulp plants though quotations on No. 1 unbleached mostly range around 2.75 cents. Soda pulp is quiet and is quoted at 3.50 to 3.75 cents per pound at producing mills, while No. 1 kraft pulp is selling at around 2.75 cents a pound. Buyers seem to appreciate fully the condition of the market, and are apparently getting the supplies desired at almost any prices within reason through the medium of counter offers to manufacturers.

F. o. b. pulp mill quotations are as follows:

Bleached sulphite	4.00-4.50
Easy bleaching sulphite	3.00-3.25
Unbleached sulphite, No. 1	2.75-3.00
News grade sulphite	2.65-2.85
Soda pulp, bleached	3.50-3.75
Mitscherlich, unbleached	3.00-3.25
Kraft, No. 1	2.75-3.00
Screenings, refined	1.75-2.00

Mechanical Pulp

Mechanical pulp is fairly steady in price and is enjoying demand of good proportions. At any rate there appears to be ample buying to absorb the great bulk of pulp offered, since offerings probably are somewhat below normal owing to many producers using nearly all of their own output and therefore having little supply to direct to the open market, and also owing to the rather limited stocks held by grinders. Furthermore, it is the usual thing for ground wood production to decline during the winter months when freezing weather ties up mills, and there is consequently little or no pressure to sell at the moment.

Domestic ground wood is selling at about $40 a ton f. o. b. pulp mills, with quoted prices ranging a little under this and up to around $44, depending on the air dry test and the freight to consuming points. Canadian ground wood is selling at $38 to $45 at producing plants, quotations across the border also depending on the haul to paper mills, producers regulating their f. o. b. prices in accordance with the freight consumers have to pay. Some Scandinavian ground wood is offered at prices ranging around $40 a ton ex dock New York or other American Atlantic ports.

Chemicals

There is a merry "war" being waged by producers of bleaching powder and competition to secure business has resulted in a drop in prices, bleach being quoted at 1.25 cents a pound and probably a shade less in some cases. Casein is holding at around 14 cents per pound, duty paid on the imported product. Caustic soda is quoted at 3 to 3.20 cents per pound, and soda ash at 1.40 cents.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	4.00- 4.25
Bleaching powder	1.25- 1.35
Brimstone (long ton, at mine)	18.00-20.00
Casein (duty paid)	14.00-16.00
Caustic soda, spot delivery	3.00- 3.25

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There are three important points in favor of Hercules Wood Rosin:

1. *Freedom from foreign matter.*
2. *Uniform composition.*
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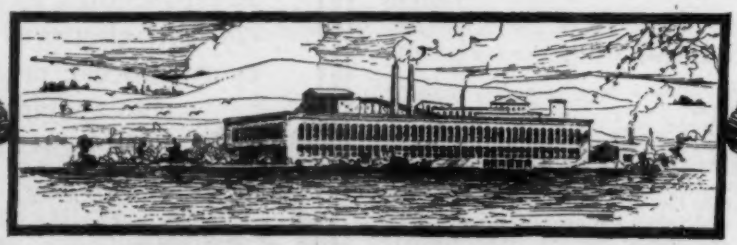

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White rag	20-45
White sulphite	11-30
Colored rag	16-40
Ledger—	
White rag	20-50
White sulphite	13-30
Colored sulphite	14-30
Colored rag	16-50
Bonds—	
White rag	19-45
White sulphite	9-30
Colored sulphite	10-30
Colored rag	18-45
Book—	
No. 1 S. & S. C	6.75- 7.50
Machine finished	6.50- 7.25
English finished	6.75- 7.50
Coated and enameled	8.00-12.00
Lithographed, M. F	9.00-14.00
Newsprint—	
Rolls, contract	3.75- 4.00
Rolls, transient	4.00- 4.25
Sheets	4.25- 4.50
Side runs	3.25- 3.75
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.80- .90
No. 2 white, 24-36	.70- .80
No. 1 manila, 24-36	.70- .80
Kraft	1.00- 1.25
Wrappings—	
No. 1 Kraft	6.50- 7.25
No. 2 Kraft	6.00- 6.50
Boards—	New York and Chicago
Solid news	55.00-60.00
Straw	55.00-60.00
Plain chip	45.00-50.00
White coated chip	65.00-70.00
Manila coated chip	55.00-60.00
Binder's board	75.00-80.00

Chemicals—(Continued)

China clay, domestic washed	12.00-15.00
China clay, foreign	15.00-20.00
Rosin, grade E	5.80- 5.90
Satin white	1.75- 2.00
Soda ash, 58 per cent light (bags)	1.40- 1.50
Starch, papermakers', in bags	3.40- 3.70
Talc (ton)	14.00-16.00

Import Statistics

That paper imports during 1923 will break all records is shown by a compilation of Department of Commerce figures made by the American Paper and Pulp Association of the import statistics for the first nine months of the year. With nearly $85,000,000 worth of paper imported for the nine months ending with September, it is evident that the year's total will, if this rate of import is continued reach $113,000,000. The nine months total is about equivalent to the highest previous year.

The totals are as follows, by months and by grades:

By Months

January	$ 8,908,326
February	7,710,512
March	9,440,723
April	9,563,912
May	10,582,733
June	9,710,893
July	9,165,907
August	10,140,431
September	9,664,829
Total	$84,888,266

By Grades

Newsprint	$72,493,213
Book	831,674
Board	2,367,649
Wrapping	3,147,864
Fine	467,629
Tissue	688,279
Hanging	426,172
All Other	4,465,786
Total	$84,888,266

To Combat Tariff Evaders

Abuses of the tariff act as it applies to the paper industry will be followed closely by the American Paper and Pulp Association as a result of the paper import conference held at the Waldorf-Astoria Hotel Thursday, November 15. Several hours of discussion by some of the best known leaders in the industry were followed by a request to the American Paper and Pulp Association to take steps to curb the abuses which are becoming so frequent as to constitute a serious menace to the domestic industry.

President Henry W. Stokes, of the Association, who presided at the import conference, announced after the meeting that the executive committee of the Association would be asked to meet at the earliest date possible to carry out the wish of the conference. What steps will be taken can, of course, not be told at this time, as this will depend entirely upon the action of the committee.

The conference was one of the most important meetings of the year, and was marked by statements from various groups in the industry indicating the extent to which foreign paper is coming into the American market in contravention of the spirit of the tariff act.

In opening the conference, President Stokes said that the meeting was called because of the damage being done to the American industry by foreign importations, and was followed by Dr. Hugh P. Baker, executive secretary of the Association, who reviewed the work already done to combat the dumping and improper entry of foreign papers.

O. M. Porter, assistant secretary, followed with an explanation of the procedure under the anti-dumping statute, and other provisions of the tariff act, and Warren B. Bullock, director of the Association's Information Service, gave figures showing the increase in sales of foreign paper.

John Matthews, Jr., of Washington, Chief of the Paper Division of the Bureau of Foreign and Domestic Commerce, told of the difficulties experienced by government representatives in getting information about foreign imports.

Representatives of the various groups affected were then asked to tell of the difficulties they were experiencing. How high grade tissue was being entered as wrapping paper under a low duty and then sold as tissue was told by the tissue paper men. In greaseproof and similar food protective papers it was told that these special papers were being entered as wrapping, and, as in the case of tissue, marketed as the high quality paper at prices which domestic manufacturers could not meet.

Wrapping paper, however, came in for extensive discussion, because of the manner in which imports have been suspected of coming under the dumping act, or undervaluation. It was pointed out that the quantity of the imports was not particularly large, but that the bankrupt sale prices at which paper from Germany, for instance, was offered, had a bad psychological effect on the entire American market.

The sentiment expressed throughout the conference was the need for curbing the abuses becoming increasingly prevalent, and there is no doubt that the Association will take steps to combat every effort of European shippers to evade the tariff act.

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Easy Bleaching
Sulphite

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Agents
SUND AKTIEBOLAG
Strong Unbleached Sulphite
(Indirect Cooking)

EXPORTS

While exports of paper from the United States during 1923 have not consistently increased from month to month, it is interesting to note that a comparison of statistics issued by the Department of Commerce in Washington show that the total value of paper exports in the first nine months of 1923 was approximately $1,500,000 in excess of the same period of last year. Increased shipments of paper board and straw board account for about one-third of the gain made during 1923, shipments of these grades having mounted by $514,921 in value over 1922.

Exports of playing cards, which rose from $413,174 in the first nine months of 1922 to $903,143 in the same time this year, and of book paper, which increased from $2,065,249 to $2,380,811, also show notable gains although in the case of the latter item the increase was due to better prices rather than to a larger volume of shipments. Exports of wrapping paper also exceed slightly in value those of 1922, but as in the case of book paper, this is a result of higher prices, the amounts shipped having actually fallen off. Exports of news print and writing papers declined both in quantity and value in the first nine months of the current year. Among the lesser items on the paper schedule, the following gains have been made during 1923 up to the end of September: Greaseproof paper, $61,290; surface-coated paper, $57,645; toilet paper, $47,366; towels and napkins, $38,327; wall board, $129,103; hangings, $126,229; carbon paper, $101,495; envelopes, $36,277, and papeteries, $35,096.

Exports of photographic paper declined $21,115 in value compared with shipments in the first nine months of 1922, although the amount exported was somewhat larger. Aside from the items mentioned, paper bags are about the only product to show any great decrease during 1923 as compared with 1922, shipments of this article having fallen off $145,238. Exports of cover paper, bristols and bristol boards, sheathing and building papers, and cigarette paper and books were also less in the first nine months of this year than in the corresponding period a year ago.

Exports of news print from the United States have been gaining in recent months. During September a total of 2,388,067 pounds, valued at $112,953, was exported, principally to Cuba, Mexico and the Philippines. Exports of news print in August last were 1,998,946 pounds, valued at $109,275. Exports for the nine months totaled 21,682,177 pounds, while imports in the same period amounted to 1,720,837,490 pounds.

IMPORTS

Wood Pulp

As is usually the case at about this period of the year, importations of wood pulp into the United States are heavy, a sharp increase in arrivals at New York and other American Atlantic ports having been noted in the past few weeks. The effect of these large shipments has been to weaken the tone of the market somewhat, notwithstanding that imports at present are nothing more than a reflection of Swedish manufacturers rushing out shipments prior to the closing of the Baltic to navigation for the winter. In certain cases importers have exerted pressure on buyers, and paper and board mills have consequently been enabled to purchase foreign pulp at attractively low prices; in fact, transactions have been recorded at levels substantially under the cost of replacement at primary sources.

At the moment, the market tone appears to be steadying. Apparently most of the pulp in so-called weak hands has been moved, consumers having absorbed it, and there is a firmer feeling among importers, who express the belief that as the winter progresses a stronger market will develop for pulp and prices will stiffen. It is felt that most paper mills are running along on low stocks and that they will find it necessary in the near future to come into view as buyers on a larger scale, and once the rush of last-open-water shipments from Scandinavia is over, available supplies will be smaller and prices will react in an upward direction.

The last available official figures, covering the month of September show that imports of pulp in that month were slightly less than in August. During September a total of 76,739 net tons of chemical pulp was imported into the United States, compared with 89,603 tons in the preceding month, and 73,564 tons in July. September imports brought the total for the first nine months of this year up to 762,255 net tons of chemical pulp, showing a monthly average of 84,695 tons, against a monthly average of 71,148 tons in the corresponding time of 1922.

Imports of ground wood in September amounted to 22,802 net tons, contrasted with 22,460 tons in August, and making a total for the first nine months of 1923 of 195,922 tons, giving a monthly average of 21,769 tons, against 14,637 tons in the same period of last year.

Current prices on foreign pulps are very irregular. Late advices from Europe tell of firmness in the primary markets. A lockout has been put into effect in the paper and pulp mills of Norway by manufacturers in an effort to force a settlement of labor difficulties in the lumber industry, and this has a tendency to strengthen pulp prices in that country. Swedish mills are reported well sold up and to have but limited tonnage of pulp to dispose of during the remainder of this year, while an early winter is reported in northern Europe and cables say it is very likely the Baltic will freeze earlier than ordinarily. Despite these bullish factors importers in New York are in some cases cutting prices on pulp, and quotations are on so broad a range it is extremely difficult to determine what actual market levels are.

Scandinavian kraft pulp of No. 1 grade has been sold down to below 2.60 cents a pound ex dock New York, yet the price commonly quoted is 2.75 cents or higher. Strong unbleached sulphite is quoted at around 2.85 cents on the dock at New York and yet sales at 2.60 and 2.65 cents ex dock have been reported. Bleached sulphite of secondary quality has sold down to 3.50 cents ex dock New York, and probably at less, though No. 1 bleached is quoted at 4 to 4.25 cents per pound. Offerings of foreign Mitscherlich sulphite at 2.90 cents dock New York, and of imported ground wood at $40 a ton ex dock at Atlantic ports have been noted.

Receipts at the port of New York in November and current market quotations ex dock New York follow:

Bleached sulphite, No. 1	$ 4.00- 4.25
Unbleached sulphite, No. 1	2.65- 2.90
Easy bleaching	3.00- 3.25
Mitscherlich unbleached	2.90- 3.00
Kraft	2.65- 2.85
Ground wood, per ton	40.00-44.00

E. M. Sergeant & Co., 875 bls. from Hafslund, 508 bls. from Gothenburg, 250 bls. from Christiania, 254 bls. from Copenhagen and 500 bls. from Greaker; Central Union Trust Co., 265 bls. from Bergen and 600 bls. from Gothenburg; Kidder, Peabody Acceptance Corp., 5,750 bls. from Hafslund; American Woodpulp Corp., 595 bls. from Bremen; E. J. Keller Co., 108 bls. from Hamburg; J. Andersen & Co., 1,500 bls. from Christiania and 750 bls. from Greaker; North German Lloyd, 261 bls. from Bremen; H. Hollesen, 23,322 bls. from Bremen; Lagerloef Trading Co., 11,532 bls. from Kotka, 508 bls. from Bremen and 5,080 bls. from Viborg; E. Naumberg & Co., 3,200 bls. from Hamburg; A. J. Bracher & Co., 1,210 bls. from Hamburg; Castle & Overton, 724 bls. from Rotterdam, 600 bls. from Hamburg and 1,800 bls. from Bremen; Bulkley, Dunton & Co., 1,625 bls. from Bremen; W. Wiese & Co., 810 bls. from Bremen; R. F. Hammond, 1,125 bls. from Gothenburg; Scandinavian Pulp Agency, 127 bls. from Gothenburg; Globe Shipping Co., 50 bls. from Hamburg; International Acceptance Bank, 1,000 bls. from Christiania; National City Bank, 250 bls. from Christiania and 250 bls. from Greaker; Johaneson, Wales & Sparre, 2,100 bls. from Harnosand, 1,250 bls. from Sundsvall and 1,400 bls. from Gothenburg; Pagel, Horton & Co., 1,200 bls. from Harnosand; Guaranty Trust Co.,

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SINCE 1881

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SOLVAY 76% caustic soda contains 76% of actual sodium oxide

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3,300 bls. from Sundsvall; Mechanics & Metals National Bank, 1,800 bls. from Sundsvall and 1,000 bls. from Greaker; Woodpulp Trading Co., 698 bls. from Bremen; United States Lines, 2,101 bls. from Bremen; Mead, Patton & Co., 650 bls. from Stockholm; Wilkinson Bros. & Co., 1,052 bls. from Hamburg; M. Gottesman & Co., 200 bls. from Hamburg; New York Trust Co., 1,500 bls. from Greaker; Tidewater Paper Mills Co., 3,300 bls. from Liverpool, N. S.; Order, 625 bls. from Gothenburg, 1,200 bls. from Sebenico and 200 bls. from Hamburg.

Paper Stock

Importations of old rope into the United States showed a marked increase in November, judging from arrivals at the port of New York, and reflecting the improved market and higher prices for this article. Papermaking rag imports were fairly heavy though probably not quite so large as in the several preceding months. Imports of all kinds of paper stock through the port of New York during November, with names of consignees, follow:

Old Rope

Brown Bros. & Co., 191 bls. and 161 coils from Rotterdam, 176 coils and 19 bls. from Hamburg, 204 coils from Newcastle, 516 coils and 29 bls. from Hull, 64 coils and 67 bls. from Antwerp, 893 coils from Bristol, 812 coils and 36 bls. from London, 38 bls. from Havre and 100 coils from Marseilles; E. J. Keller Co., 36 bls. from Hamburg, 194 coils from Newcastle, 251 coils from Copenhagen and 103 coils from Antwerp; New York Trust Co., 81 bls. from Hamburg; Ellerman-Wilson S. S. Line, 161 coils from London; International Purchasing Co., 371 bls. and 133 coils from Havre; United Fruit Co., 8 bls. from Cristobal; Irving Bank-Columbia Trust Co., 70 bls. from Genoa; Bank of New York & Trust Co., 246 bls. from Copenhagen; International Acceptance Bank, 20 bls. from London, 97 coils from Antwerp and 57 coils from Glasgow; National City Bank, 37 bls. from Barcelona; W. Schall & Co., 79 bls. from Barcelona; Ladenburg, Thalman & Co., 187 bls. and 144 coils from Havre; Order, 130 coils from Rotterdam, 64 coils and 50 bls. from Antwerp, 234 coils from London and 224 coils from Hull.

Old Bagging

E. J. Keller Co., 128 bls. from Havre, 81 bls. from Rotterdam, 141 bls. from Copenhagen and 89 bls. from Antwerp; New York Trust Co., 45 bls. from Havre; Maurice O'Meara Co., 75 bls. from Antwerp; Irving Bank-Columbia Trust Co., 28 bls. from Manchester; Mechanics & Metals National Bank, 47 bls. from Manchester and 106 bls. from Antwerp; Guaranty Trust Co., 54 bls. from Manchester.

Rags

E. J. Keller Co., 412 bls. from Havre, 176 bls. from Dunkirk, 94 bls. from Hamburg, 89 bls. from Rotterdam and 62 bls. from Antwerp; S. Birkenstein & Sons, 70 bls. from London and 179 bls. from Rotterdam; American Woodpulp Corp., 394 bls. from Rotterdam; Kelly & Co., 405 bls. from Trieste; Ignazio, Abela & Co., 92 bls. from Malta; Stone Bros. & Victor Galaup Co., 603 bls. from Havre; Katzenstein & Keene, 174 bls. from Hamburg; M. Wolfer & Co., 95 bls. from Havana; P. Berlowitz, 223 bls. from St. Nazaire; Wilkinson Bros. & Co., 83 bls. from Rotterdam; Waste Material Trading Corp., 49 bls. from Rotterdam and 38 bls. from Havre; Salomon Bros. & Co., 61 bls. from Antwerp; J. E. Lodge, 21 bls. from Havre; A. W. Fenton, Inc., 133 bls. from London; Castle & Overton, 44 bls. from Antwerp; Maurice O'Meara Co., 90 bls. from Havre; S. Silberman Co., 653 bls. from Bristol and 39 bls. from London; Albion Trading Co., 29 bls. from Liverpool; L. H. Abenheimer, 138 bls. from Hamburg; Irving Bank-Columbia Trust Co., 87 bls. from Manchester; Mechanics & Metals National Bank, 148 bls. from Havre, 212 bls. from London and 185 bls. from Manchester; Guaranty Trust Co., 134 bls. from Bremen, 305 bls. from Bristol and 178 bls. from London; Equitable Trust Co., 4,100 bls. from Havre, 13 bls. from Hamburg, 20 bls. from Dunkirk and 42 bls. from Manchester; New York Trust Co., 100 bls. from Havre, 356 bls. from Leghorn and 157 bls. from Marseilles; International Acceptance Bank, 119 bls. from Bristol, 352 bls. from Manchester, 81 bls. from Dunkirk and 50 bls. from Hamburg; Paterson National Bank, 119 bls. from London; Union National Bank of Philadelphia, 40 bls. from Antwerp; R. F. Downing & Co., 75 bls. from Manchester; Cie Generale Trans, 2,595 bls. from Havre; A. C. Fetterolf, 23 bls. from Liverpool; Goldman, Sachs & Co. 98 bls. from St. Nazaire, 50 bls. from Rotterdam, 497 bls. from Copenhagen and 189 bls. from Bremen; Kidder Peabody Acceptance Corp., 182 bls. from Antwerp; American Express Co., 171 bls. from Liver-

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pool and 49 bls. from Glasgow; Second National Bank of Boston, 69 bls. from Hamburg; First National Bank of Boston, 13 bls. from Dunkirk; Order, 5 bls. from Newcastle, 290 bls. from Leghorn, 51 bls. from London, 556 bls. from Manchester, 104 bls. from Alexandria, 277 bls. from Liverpool, 91 bls. from Dunkirk, 517 bls. from Bremen, 136 bls. from Belfast and 101 bls. from Antwerp.

Miscellaneous Paper Stock

Daniel M. Hicks, Inc., 271 bls. from Liverpool; Irving Bank-Columbia Trust Co., 88 bls. from Glasgow and 538 bls. from Antwerp; W. Schall & Co., 109 bls. from Hamburg and 72 bls. from Dunkirk; Salomon Bros. & Co., 50 bls. from Hamburg and 36 bls. from Havre; Brown Bros. & Co., 47 bls. from Glasgow and 445 bls. from Dublin; E. J. Keller Co., 298 bls. from Hamburg, 131 bls. from Dunkirk, 614 bls. from Antwerp and 24 bls. from Marseilles; Equitable Trust Co., 14 bls. from Antwerp and 41 bls. from Dundee; International Acceptance Bank, 29 bls. from Dunkirk, 166 bls. from Antwerp and 56 bls. from Glasgow; J. Fyfe & Co., 139 bls. from Glasgow; Order, 165 bls. from Belfast, 141 bls. from Leghorn, 149 bls. from Liverpool and 721 bls. from Hamburg.

Paper

That paper imports into the United States during 1923 will break all records is shown by a compilation of Department of Commerce figures made by the American Paper and Pulp Association of the import statistics for the first nine months of the year. With nearly $85,000,000 worth of paper imported for the nine months ending with September, it is evident that the year's total will, if this rate of import is continued, reach $113,000,000. The nine months' total is about equivalent to the highest previous entire year. The total imports for the first nine months of 1923 by grades is as follows News print, $72,493,213; wrapping, $3,147,864; board, $2,367,649; book, $831,674; tissue, $688,279; fine, $467,629; hanging, $426,172; all other, $4,465,786; total, $84,888,266.

Imports during November continued at a high level, judging from the amounts arrived at the port of New York in that month. Large quantities of wrapping paper were received last month, and news print shipments were fairly heavy. Usual amounts of cigarette, filter, hanging, drawing and other grades arrived. Imports of paper of all kinds through the port of New York in November follow:

Cigarette

Surbrug Co., 35 cs. from Havre; Rose & Frank Co., 20 cs. from Havre; British-American Tobacco Co., 68 bls. from Bristol; Zorro Tobacco Co., 24 cs. from Lisbon; M. Spiegel & Sons, 3 cs. from Havre; Standard Products Co., 168 cs. from Havre; R. J. Reynolds Tobacco Co., 960 cs. from St. Nazaire; DeManduit Paper Corp., 307 cs. from St. Nazaire; American Tobacco Co., 1,400 cs. from Bordeaux; P. J. Schweitzer, 130 cs. from Antwerp; J. Victori & Co., 3 cs. from Barcelona; E. Waters, 19 cs. from Marseilles; F. P. Gaskell & Co., 38 cs. from Havre; Order, 5 cs. from Trieste and 30 cs. from Southampton.

Printing

American Exchange National Bank, 68 rolls from Trieste and 204 rolls from Christiania; International Acceptance Bank, 429 rolls from Hamburg; Equitable Trust Co., 40 rolls from Hamburg; Guaranty Trust Co., 241 rolls from Hamburg; Corn Exchange Bank, 134 rolls from Hamburg; Irving Bank-Columbia Trust Co., 111 rolls from Christiania and 296 rolls from Trieste; Chemical National Bank, 1,144 rolls from Hamburg; Fourth & First National Bank, 225 rolls from Hamburg; Paper House of Pennsylvania, 27 rolls from Kotka; Parsons & Whittemore, 294 rolls from Bremen; Wilkinson Bros. & Co., 598 rolls from Rotterdam; Perry, Ryer & Co., 234 cs. from Glasgow; B. F. Drakenfeld & Co., 61 cs. from Liverpool; Seaman Paper Co., 6 rolls from Hamburg; W. Hartman & Co., 283 rolls from Hamburg; P. Puttmann, 25 cs. from Antwerp; P. C. Zuhlke, 138 cs. from Antwerp; C. Steiner, 44 bls. from Hamburg; Oxford University Press, 4 cs. from Liverpool; Hudson Trading Co., 73 rolls from Rotterdam and 144 rolls from Bremen; J. P. Heffernan Paper Co., 16 bls. from Trieste; Bernard, Judae & Co., 9 bls. from Trieste; C. H. Young Publishing Co., 141 rolls from Hamburg; Perkins-Goodwin Co., 52 cs. from Glasgow; Falsing Paper Co., 61 cs. from Hamburg; Newsprint Paper Corp., 130 rolls from Gothenburg; Order, 2,580 rolls from Sundsvall, 1,444 rolls from Kotka, 65 cs. from Bremen, 16 bls. from Glasgow, 175 rolls from Christiania, 64 bls. from Trieste, 1,006 rolls from Gothenburg and 397 rolls from Hamburg.

Wrapping

J. P. Heffernan Paper Co., 109 bls. from Bremen, 11 bls.

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presents a perfect wrapping paper, weight and strength for each wrapping purpose. Made in all weights from 15 pounds to 100 pounds basis. The one complete, standardized and economical line of wrapping paper sold.

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"The Wrapper that Delivers the Goods"

Made for maximum service
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Maximum Valve Economy "Jenkins Throughout"

Fig. 331, flanged. Standard Iron Body Gate Valve with rising spindle

Because of their great reliability and long life, Jenkins Valves have been made the standard by thousands of firms. Each year more and more plants are completely equipped with "Jenkins" because they have found that *"Jenkins throughout"* give maximum efficiency and economy in valves.

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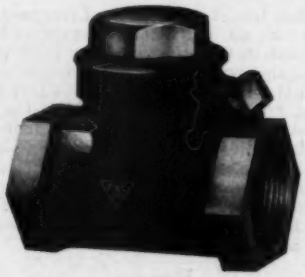

Fig. 291 Bronze Swing Check Valve

The disc can be renewed or reground with the valve in the line

Each Pratt & Cady bronze and iron valve has its own renewable feature which assures a long life in service and keeps maintenance costs low. They are built for all water and steam and oil services where the temperatures do not exceed 500° F.

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A. D. COOK, Inc.

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FIG. NO. 30

Manufacturers of Deep Well Pumps, Working Barrels, Rods, Foot Valves, Strainers and a full line of Water Well Supplies.

The accompanying half tone shows the COOK Patent Brass Tube Well Strainer with Standard Fittings, which are Bail Plug in the bottom and Foot of Blank and Lead Packer on top.

When the COOK Strainer is properly selected for the water bearing sand, capacity and method of pumping, it will successfully deliver the maximum yield of the well for many years free from sand and the troubles incident thereto.

Write for Bulletin 30A

from Hamburg and 20 bls. from Gothenburg; Republic Bag & Paper Co., 5,400 rolls from Rotterdam; Publicity Paper Corp., 356 bls. from Hamburg; Wilkinson Bros. & Co., 1,541 bls. and 1,183 rolls from Hamburg and 4 bls. from Copenhagen; H. Reeve Angel & Co., 4,100 rolls from Libau; Arkell Safety Bag Co., 22 rolls from Gothenburg; Ladenburg, Thalman & Co., 666 rolls from Hamburg; C. K. MacAlpine & Co., 178 bls. and 273 rolls from Rotterdam and 85 rolls and 29 bls. from Gothenburg; Kupfer Bros. Co., 19 cs. from Rotterdam; A. E. MacAdam & Co., 1,259 rolls and 100 bls. from Gothenburg; W. Schall & Co., 3,741 rolls from Hamburg; Standard Underground Cable Co., 138 Rolls from Glasgow; Bernard, Judae & Co., 32 bls. from Hamburg; American Express Co., 2,851 rolls and 6 bls. from Gothenburg; Baldwin Universal Co., 31 bls. from Hamburg; New York Trust Co., 3,073 bls. from Trieste; National City Bank, 74 rolls from Hamburg; Irving Bank-Columbia Trust Co., 288 bls. from Hamburg, 124 rolls from Gothenburg and 1,030 rolls from Bremen; Guaranty Trust Co., 256 bls. and 82 rolls from Hamburg; International Acceptance Bank, 972 rolls from Hamburg; Chatham & Phenix National Bank, 171 rolls from Gothenburg; Chase National Bank, 25 bls. and 20 rolls from Hamburg; Chemical National Bank, 173 bls. and 1,680 rolls from Copenhagen; Peoples Trust Co., 5,404 rolls and 40 bls. from Gothenburg; Great Eastern Paper Co., 134 bls. from Gothenburg; Maurice O'Meara Co., 828 bls. from Sundsvall and 65 bls. from Bremen; Goldsmith & Co., 48 bls. from Rotterdam; W. Hartman & Co., 35 rolls and 745 bls. from Hamburg; Blauvelt Wiley Paper Mfg. Co., 60 bls. from Glasgow; C. G. Keferstein, 23 bls. from Bremen; Fernstrom Paper Co., 50 bls. from Hamburg; Gallagher & Ascher, 107 bls. from Hamburg; C. Steiner, 22 bls. from Bremen; Order, 2,020 rolls and 205 bls. from Bremen, 734 bls. and 58 rolls from Hamburg, 2,947 rolls and 134 bls. from Gothenburg, 3,134 bls. from Trieste, 3,954 rolls from Rotterdam and 70 rolls from Copenhagen.

Writing

O. G. Hempstead & Son, 18 cs. from Hamburg; Defiance Mfg. Co., 14 cs. from Marseilles; W. Schall & Co., 17 cs. from Hamburg; Sternberg & Co., 44 cs. from Marseilles; Publicity Paper Corp., 140 cs. from Trieste; F. L. Kraemer & Co., 9 cs. from London; J. W. Hampton, Jr., & Co., 32 cs. from Hamburg; Globe Shipping Co., 3 cs. from Southampton; G. W. Sheldon & Co., 17 cs. from Southampton; F. C. Strype, 13 cs. from Marseilles; A. Murphy & Co., 2 cs. from Southampton; Order, 4 cs. from Hamburg.

Drawing

Keuffel & Esser Co., 147 cs. from Hamburg, 2 cs. from Rotterdam and 6 cs. from Liverpool; Globe Shipping Co., 103 cs. from Bremen; Hensel, Bruckman & Lorbacher, 3 cs. from Bremen; H. Reeve Angel & Co., 8 cs. from London.

Filter

C. D. Stone & Co., 2 cs. from London; Orbis Products Trading Co., 20 bls. from Bordeaux; H. Reeve Angel & Co., 13 cs. from London and 8 bls. from Bordeaux; Bernard, Judae & Co., 6 cs. from Gothenburg; E. Fougera & Co., 95 cs. from Antwerp; A. Giese & Son, 3 bls. from Bordeaux; J. Manheimer, 80 bls. from Southampton.

Tissue

Meadows, Wye & Co., 8 cs. from Liverpool; F. C. Strype, 42 cs. from Liverpool; Order, 2 cs. from London.

Photo

J. J. Gavin & Co., 2 cs. from Liverpool; Gevaert Co. of America, 80 cs. from Antwerp; P. C. Zuhlke, 52 cs. from Antwerp; Eastman Kodak Co., 2 cs. from Antwerp; F. Henjes, Jr., 16 cs. from Bremen; Globe Shipping Co., 235 cs. from Bremen.

Hanging

W. H. S. Lloyd & Co., 45 bls. from London and 40 cs. from Liverpool; A. C. Dodman, Jr., & Co., 157 bls. from Liverpool and 58 bls. from Southampton; A. W. Fenton, Inc., 29 bls. from Hamburg; A. Murphy & Co., 3 bls. from Southampton and 2 bls. from Havre; International Mercantile Marine Co., 3 cs. from Southampton; Thomas & Pierson, 1 cse. from Southampton; M. J. Corbett & Co., 12 cs. from Hamburg; F. J. Emmerich & Co., 10 bls. from Southampton and 49 bls. from Liverpool; F. G. Prager & Co., 789 rolls from Hamburg; National City Bank, 465 bls. from Bremen; C. G. Keferstein, 1,017 rolls from Hamburg; Hallgarten & Co., 1,432 rolls from Hamburg; Morrison Machine Co., 13 bls. from Havre; Order, 6 cs. from Antwerp and 9 bls. from Bremen.

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Type OMD

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for

Water, Acid and Stock

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Chemistry of the Sulphite Process: R. N. Miller and W. H. Swanson.

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Pulp & Paper Trading Co., 78 rolls from Rotterdam; F. Henjes, Jr., 4 cs. from Hamburg; H. Maillard, 10 cs. from Havre; Friedman & Co., 18 cs. from Bremen; O. M. Baxter, 40 bls. from Gothenburg; American Express Co., 4 cs. from Havre; R. F. Downing & Co., 2 cs. from Havre; Harriet Hubbard Ayer, 5 cs. from Havre; Richardson Bros., 21 cs. from Liverpool; Metropolitan Importing & Mfg. Co., 172 cs. from Hamburg; Bendix Paper Co., 124 cs. from Hamburg and 4 cs. from Rotterdam; Buschmann Bros., 155 rolls from Hamburg; Phoenix Shipping Co., 30 cs. from Bremen and 7 cs. from Hamburg; Flexideal Co., 100 cs. from Bremen; A. Vuyk, 168 bls. from Rotterdam; O. G. Hempstead & Son, 8 cs. from Bremen; State Bank, 4 cs. from Bremen; F. G. Prager & Co., 20 cs. from Hamburg; New York Label & Box Works, 7 cs. from Hamburg; Order, 23 bls. from Hamburg.

Miscellaneous

C. B. Richard & Co., 23 cs. from Hamburg and 6 cs. from Bremen; Japan Paper Co., 68 cs. from Genoa, 5 cs. from Havre and 31 cs. from Gothenburg; DuPont Cellophane Co., 75 cs. from Havre; Coenca-Morrison Co., 10 cs. from Havre; Whiting-Patterson Co., 15 cs. from Havre, 27 cs. from Southampton and 3 cs. from Hamburg; Borden & Riley Paper Co., 11 cs. from Antwerp; C. W. Williams & Co., 22 cs. from Antwerp; F. B. Vandergrift & Co., 13 cs. from Hamburg; Guibont Freres Co., 32 cs. from Havre; Judson Freight Forwarding Co., 12 cs. from Havre; American Shipping Co., 19 cs. from Hamburg; A. Frankan & Co., 19 cs. from Breman; R. H. Meehan & Co., 22 cs. from Bremen; Hensel, Bruckman & Lorbacher, 5 cs. from Bremen and 20 cs. from Hamburg; Quality Art Novelty Co., 49 cs. from Hamburg; New York & Huseatic Corp., 17 cs. from Hamburg; Hoole Service Co., 56 cs. from Hamburg; J. W. Lyon & Co., 25 bls. from Havre; Birn & Wachenheim, 108 cs. from Bremen; H. Reeve Angel & Co., 7 cs. from Gothenburg; Martin & Bechtold, 22 cs. from Bremen; P. H. Petry & Co., 14 cs. from Hamburg.

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 8083—Printing, sulphate and wrapping paper. Antofogasta, Chile. Exclusive agency desired.

No. 8082—Waterproof packing paper. Stockholm, Sweden. Purchase desired.

No. 8103—Chemicals for paper manufacture, including caustic soda, chlorinated lime, potassium peroxide and saltpeter. Vienna, Austria. Agency desired.

No. 8212—Parchment paper for wrapping butter. Stavanger, Norway. Purchase desired.

No. 8153—Parchment, pure vegetable. Stavanger, Norway. Purchase desired.

No. 8258—Paper boxes for candy, and tinfoil paper. Havana, Cuba. Agency desired.

No. 8318—Printing and bookbinding papers and materials. Rajkot, India. Purchase and agency desired.

No. 8310—Printing paper, white, unglazed, I. F. and M. F., and bank M. F. colored tissue. Agra City, India. Purchase and agency desired.

No. 8249—Rosin for paper mills. Milan, Italy. Purchase and agency desired.

No. 8267—Sulphur for paper mills. Stockholm, Sweden. Purchase and agency desired.

Experiments in the Use of Glue in Coated Paper

The Bureau of Standards is carrying out some experiments dealing with the use of glue in coating paper. Nine runs have recently been made on the experimental coating machine, using two makes of bone glue for eight of the runs and a French casein glue for one. The clay used for all runs was Lee Moor, a good grade of English coating clay. The results indicate that the water resistance of glue-bound coating containing chrome alum compares favorably with that of casein-bound paper containing no formaldehyde.

It is believed that the degree of waterproofness will prove sufficient for most of the papers used for halftone printing. Difficulties have been experienced in obtaining a uniform coating, because of variation of the fluidity of the coating mixture and mechanical defects in the machine, so that additional work will be necessary before paper suitable for printing tests can be produced.

Rigid Economy in Material Handling accomplished with

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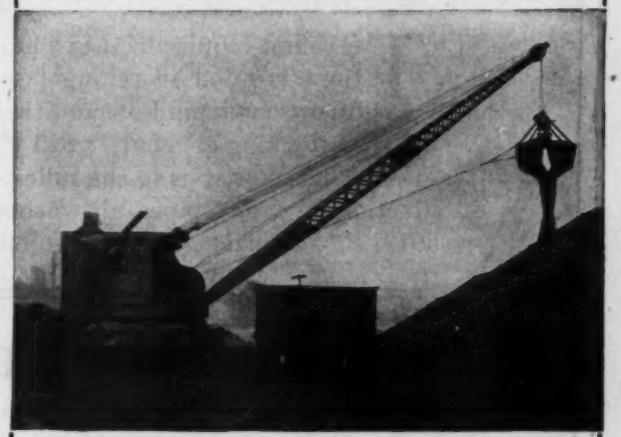

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MAKES your pulp of better quality. The action of the Howard Refiner is to brush out any fibrous material to pulp with a minimum of injury to the fibre.

The quality of pulp produced will be found much better than the pulp as generally reduced. This improved quality means a higher net value per ton.

The Howard Refiner is a time tried machine. It is in use in many paper mills in the United States, Canada and other countries and is giving excellent results.

Detailed information will be gladly furnished on request.

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For Protecting Steel Against Water and Dampness

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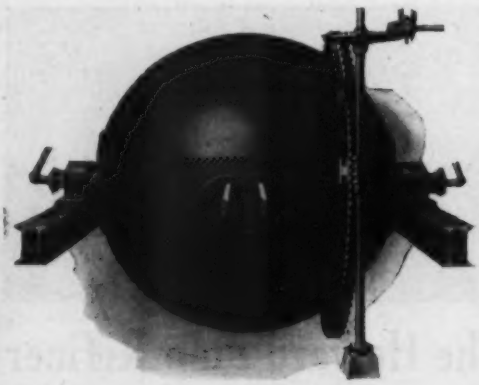

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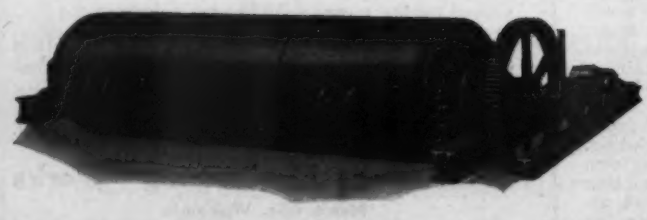

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